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Vol. XII TORONTO, MARCH, 1922 No. 3

# SOME TENDENCIES IN MODERN CLINICAL MEDICINE*

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PERHAPS no more striking evidence of the trend of ideas in Clinical Medicine is afforded than by a visit to a well-organized Department of Anatomy in which one finds the teaching directed not to anatomical details as such, not to nomenclature in all its frightfulness, but to the reasoning out of the functions of the various anatomical structures. In other words, function is the goal of anatomical knowledge. Hence it is in the daily demonstrations around the cadaver that one hears the almost parrot-like dissecting-room queries—What is this muscle or nerve for? What does it do? Pick up the muscle that bends the elbow—show me its nerve, etc. But the cadaver itself is used merely because dissection of the living man is obviously impracticable, and so the living subject is introduced and studied and the function of anatomical structure is explained with reference to motion, sensation and the like. In this way structure is associated with the body and its functions, and not with books.

As in anatomy, so in the teaching and study of clinical medicine. Throughout the entire field, one finds more and more attention being paid to the estimate of bodily functions in any clinical investigation of the different vital organs.

The attitude towards diseases of the heart, for instance, has in recent years undergone an almost epoch-making change. Every detail of the physical examination of the heart, important as it is, has now become of minor significance compared to the consideration of the organ as a whole. What can the heart do? What is it capable of enduring? How much is its reserve power? These are the questions that occupy the minds of physicians more than the question of morbid anatomical change *per se*. Less and less stress is being laid upon the size of the heart; its position, shape and outline. Not that these investigations are devoid of interest and importance and have their place in the complete examination of every individual; far from it, but they are of significance only insofar as they tell of bodily function. It is well recognized now that the size, position and shape of the heart are all so much determined by the type of the individual, the age, the sex and the posture, that variations within the normal are fairly wide. What matters it, after all, if the apex-beat be just outside the nipple line, if after exertion a man's pulse-rate is unaffected and his respirations unaltered; comparatively little, I would judge, though it, too, must count in the final estimate. We learn to speak of transverse hearts, long hearts, drop hearts, etc. as indicating not a cardiopathic condition per se, but merely a type of individual, just as we would speak of those who are robust or myasthenic in their conformation.

To a large extent, too, the appreciation of murmurs has undergone a considerable modification and their presence occupies a secondary role. Why indeed should it be otherwise when the victim of aortic disease for 25 years can ride his bicycle 60 miles a day without obvious harm. To-day our students are taught that the stethoscope comes fifth in importance and that in the scheme of investigation the history of symptoms is of prime practical importance. Insurance Companies have already long since learned that murmurs in themselves are not prohibitive of good insurance. Dependent as it is upon the

*Abstract of lecture delivered before the Ottawa Medical Society.

condition of the myocardium, the function of the heart is largely estimated by those methods which can make clear its functional power. It is for this reason that stress must be laid most of all on two features of a cardiac examination. First, the history; and next, the electro-cardiogram. Thus it is that during convalescence, the weakness, the dyspnoea on exertion, the slight oedemas, are all expressions of myocardial involvement to a greater or less extent, and in fact, of the weakened functional power of the organ.

Aschoff and others have demonstrated some years ago the early involvement of the myocardium in all acute infections. Hence the unusual care in modern times in examination of the heart after tonsillitis, the exanthemata, and indeed, in any acute infectious disease. These early manifestations of myocardial weakness find their more complete expression in the cardiac asthma, the winter bronchitis, and other signs of decompensation, when the myocardial degeneration has become pronounced. Green has admirably exposed the need for early recognition of myocardial disease to save the implicated muscle, and the means of its repair. It is in reference to this cardiac function that the electrocardiogram is becoming more and more important as an estimate of cardiac power, and not infrequently the inverted T. provides the only means of recognizing the possibility of impending death.

What applies to the heart is equally referable to the study of diseases of the kidney. Whereas in the past the anatomical lesions, as expressed in albuminuria and the presence of casts, were considered all important, to-day we recognise the functional power of the kidney as displayed by the quantity of day and night urine, by the variations of specific gravity in individual specimens, by the phenol sulphonephthalein test, and the urea and chloride contents of the blood, as the all-important means of studying diseases of the renal system. This point of view is too well recognized to need further mention here.

With reference to gastric diseases, clinicians and anatomists have come more and more to realise that the size, shape and position of the normal stomach may vary so widely that any standardization is well-nigh impossible. Function is the determining factor. The outline of the normal stomach varies according to sex, age and the conformation of the individual. Shape and size, tone and peristalsis are so greatly modified by changes in the stomach itself, and its relations to the surrounding viscera, that no one form can be described as typical. After all, the stomach is to be regarded as a living muscle and a highly-sensitive muscular organ, and as such it is constantly undergoing modifications determined by various factors; the quantity and quality of the contents; the period of the digestive process; the degree of development of the gastric musculature; the state of the adjacent viscera and the condition of the abdominal muscles. The stomachs of individuals, like their faces, conform to certain general types, but no two are quite alike. The position of the stomach in the abdomen is of no great importance except insofar as it affects function. Hence it is that, in its supposedly normal position, high in the abdomen, it may, when distended, produce pathological symptoms, either directly by raising the diaphragm, the heart and the pericardium, and thereby inducing irregularities of the pulse, dyspnoea and vasomotor disturbances, or indirectly by affecting the gastric plexus derived from the vagi and its associated sympathetic fibres, as well as the coronary plexus.

In another individual the organ may lie low in the pelvis without entailing any disturbance of its function, and to that extent it is a normal viscus. A gastroptosis—so-called—is in the first place much more common than is generally supposed, especially in women. To say of a man that he has gastroptosis is equivalent to saying, in most instances, that he is tall and thin; not enough stress is laid on habitus, i.e., the shape and build of the owners, in the consideration of gastric disease. The tall, thin man with gastroptosis as a rule manifests other signs which explain the low-lying organ, for generally in such patients not only is the stomach low but so also are the diaphragm and the heart, while the skeletal musculature is flabby; such a man is abnormal only insofar as he presents a type of myasthenia, one in whom atony of the gastric muscles and laxity of the ligaments accompany the other conditions. It should not be forgotten, too, that change of posture may alter the position of the stomach as much as five inches, a fact which explains the discrepancies found at the operating table on the one hand and under the fluorescent screen on the other.

Realizing, then, the relative unimportance of anatomical findings, attention has been centred more and more upon secretions and motor power, the two factors which determine gastric function.

With reference to secretions, the standards of normality have undergone a very striking re-

vision. Thanks to the interesting observations of recent investigators, notably Rehfuss, with his fractional methods of analysis, it has become evident that normal gastric acidity varies within much wider limits than was previously suspected. The normal maximal total acidity has been raised from 60% to a possible 200%, while free hydrochloric acid may normally exceed the existing standards by double its quantity, these variations depending upon many simple factors; the amount of food; the period of digestion; the temperament of the individual, etc. Hence it is that the clinical significance of high acidity values has undergone a considerable change.

It has been suggested that the term "hyperacidity" be applied clinically only to such cases where the *symptoms* exist (burning sensations, pain and hunger, with relief after food, etc.) irrespective of the actual figures found on analysis. After all, hyperacidity is but an expression of some form of irritation which may be gastric or extra gastric. While it is associated in the minds of surgeons with irritation arising from three chief locations, viz., the gallbladder, appendix and stomach, it should not be forgotten that many other conditions may initiate similar irritations and consequent acidity. I refer to such conditions as tabes dorsalis, with its gastric crises; to migraine, with its intermittent hypersecretion, and often hyperacidity; to neuroses of various kinds, irrespective of organic disease.

Motility of the stomach has a very close relation to the degree of acidity, and it would seem that in various ways the two are dependent upon each other. The excessive peristalsis of the gastric muscle is in itself often an expression of the same kind of irritation which produces acidity, and high degrees of acidity are often associated with spasms to a very marked degree.

No satisfactory estimate of gastric function can be made without a consideration of the history of the symptoms, the degree of acidity and the motor power, and it is for this reason regrettable that Radiology has introduced into medicine one of the bugbears of modern clinical medicine, viz short cuts to diagnosis! The slavish adherence to *x*-Rays as the panacea for diagnosis in gastric disease and as a solution of all difficulties in diagnosis has given rise to not a little disappointment in this method of diagnosis. Surgeons and physicians alike have hitherto expected too much from radiology for the simple reason that too great dependence on one examination of this kind has often led to error. Is it any wonder, then, that cases of tabes and lead colic are not infrequently diagnosed after the *x*-Rays have failed to clear the doubt in diagnosis when a careful history of the case could easily have obviated the useless radiological examination?

Few experts in radiology regard their methods as anything else than accessory to diagnosis; an axiom that applies most of all to diseases of the alimentary tract. How often is one led astray by a single examination; or still more so, by a single plate, without the use of the fluorescent screen!

Certain cardinal rules should always be observed in examinations of gastric conditions by radiography:—

1.—Careful examination by the screen for at least 15 minutes after ingestion of the barium; this to be followed by serial plates.

2.—No diagnosis in doubtful cases should be made without repetition of the examination.

3.—The radiological report is to be considered only in conjunction with all other methods, including especially the careful history of the case.

According to the position and tone of the stomach, the peristaltic movements may give to the outline of the stomach almost any abnormal form, simulating hour-glass contracture, pyloric stenosis, etc. Certainly the *x*-Rays are no more a panacea for all diagnostic difficulties than is any other individual test by itself.

No area of the body affords more complexity in diagnosis than does the so-called region of surgical romance. I refer to the right hypochondrium, encroached upon, as it is, by so many of the abdominal viscera.

When one considers the variations that may occur in the radiograms through adhesions between any of these organs, one can more readily understand the surprises that come to the surgeon when he finds that, after all, the evidence was not sufficient to warrant an exploratory laparotomy. No one will deny, I think, that the tendency in modern days is to trust too much to this form of diagnosis to the exclusion of many other evidences which go to make up a complete clinical picture. There is no doubt that both physicians and surgeons are equally to blame. True it is that the over-cautious physician may be responsible for unnecessary delay in not recommending operation, and that an early cancer of the stomach and a long-suffering appendix may both develop dangerous symptoms because an exploratory laparotomy had not been done earlier; but in contrast to this is certainly the unneces-

sary rush to the operating table without full consideration of all the available tests, as well as proper appreciation of the habitus of the patient upon whom the operation is undertaken.

Let me not be misunderstood as denouncing rational surgery of the stomach, nor justifiable exploration. I merely wish to stress the point that, among the short cuts in diagnosis, these long incisions of unwarranted laparotomy are striking examples. Such a state of affairs, with its slavish adherence to the surgeon alone for diagnosis and treatment in dubious abdominal conditions, tends to a metamorphosis of the physician's office into a distributing agency for surgeons and specialists, and recalls to one's mind the medical services of the army, where the disposal of patients, rather than their complete diagnosis, was the main consideration of the time.

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# "MARROW PAINS" IN MALARIA AND IN CERTAIN OTHER ACUTE FEVERS

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THE present article is an attempt with limited pathological knowledge and restricted clinical experience to handle a clinical problem from a point of view suggested originally by experimental laboratory findings.

During the war the writer was at one time engaged in treating malaria patients in Macedonia. It so happened that he had previously in conjunction with another worker been conducting a laboratory research on the fate of foreign particles injected into the blood stream (1). There appeared to be a relation between these experiments and the disease of malaria.

The results of the laboratory investigation may first be briefly recorded. When fine particles of Indian ink suspended in saline solution are injected in large amount into the blood-vessels of a rabbit, the black pigment mixing with the systemic blood at first discolours it (if the rabbit is an albino its eyes and mucous membranes become dark), but the discoloration rapidly disappears, and within the space of an hour or better, microscopic examination of films of the blood may fail to reveal a single particle of the black ink. The vascular apparatus evidently includes a mechanism for the prompt and effective removal of foreign matter.

When the injected animal is killed and opened up the greater part of its tissues appear absolutely clean of ink, so it is plain that the material has not adhered to the ordinary endothelium inside the vessels. The liver, however, is as black as coal. So is the spleen. The bony ribs show up through the chest wall conspicuously black in colour, and the thin cranial bones are similarly discoloured; when a long bone, such as the femur, is split open, the marrow comes out jet-black, the bone itself being free from pigment. As a rule, but perhaps not invariably, the pigment finds a lodging also in the lung and in the kidney. With the enumeration of the above five localities, liver, spleen, bone marrow, lung and kidney, the list of settling places is exhausted. The invariable absence of pigment in all the other organs is just as striking as its constant presence in liver, spleen and bone marrow.

When the pigment settles in lung and in kidney, microscopic examination reveals its presence as emboli plugging respectively pulmonary and glomerular capillaries; here it is collected by some process which is purely mechanical. In the other three organs, viz., liver, spleen and bone marrow, the pigment does not plug blood channels, but is ingested by cells lining the walls of the capillaries or sinusoids of the organ in question, the blood channels still remaining free. Consequently we conclude that the endothelium lining certain portions of the three organs, liver, spleen and bone marrow, differs from that of ordinary vessels in being phagocytic towards foreign particles.

A section of spleen shows a greater total proportion of pigment than one of similar thickness from either the marrow or the liver. The pigment is present only in that part of the splenic

pulp which does not consist of lymphoid tissue, in other words it is absent from the Malpighian bodies just as it is absent from the trabeculae. In the liver the pigment is caught by the Kupffer cells, in the bone marrow by isolated cells lining the so-called "venous capillaries" (in reality sinusoids) of the tissue.

In malaria, a disease due to a parasitic infection of the blood, we know that granules of melanin pigment (from disintegrated erythrocytes) as well as the organisms of the disease, congregate in the liver, in the spleen and in the bone marrow. The spleen becomes enlarged, so also in many cases does the liver. The patient during a paroxysm suffers in addition from fairly severe pains, which may involve various regions of the body. On the assumption that these pains might originate in bone marrow, the author set himself the task of tabulating in a large number of cases the sites of the pains complained of by patients. Neglecting the occurrence of tenderness on pressure over the spleen and the frequent occurrence of epigastric or umbilical pain (provisionally classed as a referred pain), all the other pains of the disease were referable to regions containing bone marrow.

The most frequent pains of all, and present in all cases, are pain in the back (especially sacral and lumbar, though sometimes dorsal as well) and headache (back of eyes, frontal, vertical or occipital, as the case may be). Next in frequency are pains above and below the knee; then pains in the upper arm; more rarely in the lower part of the tibia and foot, or in forearm and wrist. Remarkably enough no case of costal pain was found, though in rare cases sternal pain was complained of. Pain in the cervical region was only once met with. Unlike the splenic tenderness, which is educed by pressure, and in marked contrast with the pains of trench fever, these particular pains were in no way aggravated either by locally applied pressure or by movement and exercise. This discovery seemed further to support the view that they are marrow pains. The only unilateral pain of malaria is the splenic tenderness; the "marrow pains" either involve the region of the axial skeleton or are symmetrically distributed in the limbs.

As a point of incidental interest it may be recorded that familiarity with the sites of malarial pain proved to be of value in differential diagnosis and in dealing with men who professed to have had recent attacks of malaria, one man after a purely verbal examination admitting that he had invented his symptoms.

The Indian ink experiments would appear to throw light upon some other organismal diseases besides malaria. When we encounter diseases in which post mortem examination reveals a simultaneous and massive phagocytic action on the part of the liver, of the spleen and of the bone marrow, we are enabled , arguing backwards, to say that the infecting organisms had reached these sites after being first of all free in the blood. Good examples are typhoid fever and kala azar. Current descriptions of the latter disease do not lay particular stress upon the site of such pains as may be associated with it, though such information would be of interest. To judge by the literature and by the author's own experience while in charge of cases in the Army, the pains of typhoid fever include "marrow pains." Still another disease of interest in this connection is small-pox, in which, while the presumable causative organism has not yet been identified, post-mortem examination discloses necrotic areas in spleen, liver and bone marrow; in small-pox, even more than in typhoid fever, pain in the back and pain in the head are outstanding clinical features. Relapsing fever, with pain in the back and symmetrically distributed in the limbs, is another fever in which organisms are deposited in massive amount from the blood in the bone marrow.

In thus boldly dubbing the symmetrically distributed pains of a restricted group of micro-organismal diseases "marrow pains," the author may appear to show a degree of assurance greater than he himself entertains or than the evidence warrants. Headache and backache certainly are associated with disease of structures other than those here indicated, though their conjunction in one and the same disease is not altogether common. The particular phrase used in the title of the paper was chosen rather with a view to invite inquiry by clinicians (short of that it may serve, until controverted, as a convenient mnemonic), for in dealing with the difficult question of malaise and pain in fevers any rationally constructed hypothesis seems worthy of systematic critical study. It is not beyond possibility that the pains in question are indeed marrow pains, in which eventuality their further investigation may prove to have a helpful bearing on early diagnosis.

While the organisms of many diseases, when liberated into the blood, find a lodgment in the particular organs above specified, it should not be assumed that any and every variety of organism must under similar circumstances suffer an identical fate. To be caught in liver, spleen and

bone marrow, the organism must possess a surface similar, in respect of its (molecular) adhesive relationships, to Indian ink particles—see a paper by the author on this subject (2). The problem of grouping micro-organisms according as they are or are not liable to be ingested by liver, spleen and bone marrow, when they are artificially introduced into the blood, is one that has yet to be worked out by pathologists and bacteriologists, and, it may be added, one that would seem to deserve systematic investigation.

Apart from the special question of bone marrow involvement, one additional point of clinical and pathological interest in connection with the above mentioned Indian ink experiments is the astonishing speed and efficiency with which foreign particles mingled with the rapidly coursing blood are sifted out and held captive in fixed localities. Within the space of a single hour millions and millions of particles may be removed from suspension in the circulating plasma. This striking experimental result helps to throw light on the difficulty so frequently experienced in isolating from the blood organisms which are known to be transported in enormous numbers by it (consider e.g. so-called "septicaemia" or typhoid fever). Malarial organisms can be found with the microscope in films of blood because inside red blood corpuscles they are temporarily protected against phagocytic capture.

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# A RATIONAL TREATMENT OF SURGICAL SHOCK BASED ON PROVEN PHYSIOLOGICAL DATA*

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THE condition met with clinically known as surgical shock is the end result of several contributing causes. That there are many such seems clear and up to the present no single etiological factor has been accepted as the invariable cause. Clinical observations and physiological studies all tend to show that shock is essentially a partial suspension of circulation. This state of altered circulation will account for practically all the phenomena commonly seen in shock such as pallor, thirst, rapid pulse, low blood pressure and capillary stasis. Most of these symptoms are similar to those seen after haemorrhage but in shock the blood picture does not indicate the degree of anaemia one would expect to find associated with the other severe symptoms.

The changes which take place in the altered state of circulation may be considered under the following headings:

1.—Change in Blood Volume.
2.—Change in Distribution of Red Blood Cells.
3.—Change in Haemoglobin.
4.—Change in Blood Pressure.
5.—Change in the Chemistry of the Blood.

Keith (1) in his studies of shock found that the total volume of blood and plasma was consistently reduced in all cases of shock and the diminished blood volume was in direct ratio to the severity of the symptoms present in any given case of shock. Mann (2) in his experiments on animals found the amount of blood stagnant in the tissues in shock to be as high as 50% above the normal. Ray and Brown (3) noted that in chloroform anaesthesia the capillaries were double their normal diameter thus quadrupling their capacity. These facts show that a considerable volume of blood is lost to the circulation.

Cannon, Fraser and Hooper (4) in their study of shock made valuable observations on the changes which take place in the distribution of the red blood corpuscles and concluded

*Read before the Alberta Medical Association, August, 1921.

1.—That the red cell count of blood taken from various capillaries is higher than that taken from veins.

2.—The discrepancy is greater the more profound the shock, and not infrequently is as great as 2,000,000 per cubic millimeter.

3.—Since the blood in the veins is normal the difference is due to stagnation of the corpuscles in the capillaries.

Bazett (5) found that in shock, due to any cause, the percentage of haemoglobin was reduced. He believes that the estimation of the degree of haemoglobinaemia to be as important as the estimation of the blood pressure.

That there was a lowering of the blood pressure in all cases of shock has long been recognised. Comell (6) in the late war made extensive studies of soldiers suffering from wound shock. His observations embraced all varieties of battle injuries and show that wound shock is always accompanied by a fall of blood pressure. In certain types of cases the systolic blood pressure may be as low as 30 mm. of mercury. Shock may come on at once after injury and is termed primary shock; or it may come on later as a result of exposure to cold, pain, anxiety, thrist, or toxemia and is termed secondary shock. Any patient with a systolic blood pressure below 90 should be regarded as in a critical state.

Undoubtedly changes take place in the chemistry of the blood also which are not yet understood. We know normal blood is alkaline and in shock there is an acute acidosis. Henderson (7) has shown that there is a deficiency of carbon dioxide in the blood and believes it to be a consequence of acidosis.

Crile (8) in his recent monograph brings forth the theory that shock is a form of exhaustion of brain cells due to excessive stimulation through afferent nerves. This state of exhaustion he thinks may be brought on in a variety of ways, as by fear, anxiety, exposure, trauma, infection, haemorrhage, or excessive stimulation. All these factors can cause exhaustion but the histological changes observed by Crile in the brain cells may be the result rather than the cause of shock.

It may be concluded, as having been demonstrated, that in the patient suffering from shock there is less than the normal amount of blood in circulation; there is a stagnation of blood in the capillaries and this stagnant blood is abnormally high in red blood corpuscles; there is a loss of haemoglobin; a diminution of the normal percentage of carbon dioxide in the blood and this lowering of the percentage of carbon dioxide means lowering of the percentage of carbon dioxide means a relative uncrease in the H-ion content or in other words acidosis.

### Treatment of Surgical Shock

From a practical point of view the treatment of surgical shock may be divided into prophylactic and active.

Under the heading of prophylaxis comes the eliminating of factors conducive to shock such as fatigue, worry, fear of operation, excessive or deep anaesthesia, prolonged anaesthesia and draining the tissues of fluids by purging before operation. The anaesthetised patient should be handled as gently as possible and due regard paid to warmth and stimulation. Thirst should be treated at once by rectal drip of glucose—soda solution.

The active treatment I would like to subdivide into the treatment of cases with shock following operation and the treatment of cases with shock requiring operation. If we pay proper attention to prophylaxis we should have few cases of shock following operation. Where shock does occur the following points are worthy of note. Keep patient warm. Elevate foot of bed. Relieve pain by morphine if there is no cyanosis. If there is cyanosis do not give morphine. Crile recommends the administering of nitrous oxide and oxygen for the relief of pain in cyanotic patients. Transfuse if systolic blood pressure remains below 90 for more than half an hour. Blood transfusion is to be preferred if a suitable donor can be obtained at once but where this is not practicable give 500 c.c. of gum-saline solution intravenously. A second transfusion may be necessary. Large quantities of fluids should be given by mouth or rectal drip for the succeeding 24 hours. Do not rely on drugs, their action is so uncertain that they cannot be relied upon.

In the management of cases of shock which require a serious operation we have a much more difficult task before us. Performing a major operation on a patient in a severe state of shock means certain death. The shock of the operation added to that already present lowers the point of exhaustion to a level from which there is no return. Certain types of injuries are prone to be accompanied by shock e.g., fractured femurs, all compound fractures, head injuries, ruptured viscus. In all such cases the so-called

emergency operation performed without allowing the primary shock to pass off may mean death. The use of the sphygmo-manometer and the haemoglobinometer are of the utmost value in estimating the degree of shock and indicating when operation may be safely undertaken.

Bazett (9) considers a haemoglobinaemia of 35-40% the critical point, where the haemoglobin reading is as low as this it is a contra indication to immediate operation. Where the systolic blood pressure is below 90 it is also a contra indication to immediate operation. We have here two clinical tests at the disposal of everyone which can be put to use in a few minutes and should govern the subsequent treatment of the shocked patient so as to bring him safely to and safely through an operation. Primary or secondary shock may pass off with the employment of such simple remedies as securing of rest bya dministration of enough morphine to keep patient comfortable, application of heat, arrest of haemorrhage, allaying of thirst. Where systolic blood pressure remains below 90 for one half an hour transfuse with 500 c.c. of citrated blood, or gum-saline solution. Delay operation until the blood pressure is stabilised. It is preferable to delay operation till blood pressure reaches 100 as the operation will likely cause a second drop in blood pressure. This is particularly so if the operation is likely to necessitate much bleeding. A second drop in the blood pressure is a more serious symptom than the first and makes blood transfusion imperative. The choice of an anaesthetic is also important. Marshall (10) clearly shows the advantage of nitrous oxide and oxygen in these cases and Crile (11) gives a preference for nitrous oxide and oxygen in all cases. He believes that ether and chloroform allow afferent impulses to reach the brain and these stimulating impulses cause an exhaustion of brain cells. We all know ether or chloroform anaesthesia to be a much greater tax on the average patient than nitrous oxide and oxygen and the patient in shock is a poor operative risk.

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## ANTERIOR POLIOMYELITIS*

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THE following notes regarding recent cases of anterior poliomyelitis are based chiefly on the Children's Hospital records from October 1, 1920, until the end of October 1921; a period of 13 months. Included in the review are some cases which one had the opportunity of seeing in one's own practice and through the kindness of other doctors. The number of cases is too small to draw therefrom any far reaching conclusions.

A short study of these cases will, however, convey to us some idea of local conditions in regard to poliomyelitis. In October 1920 we noticed that the cases of recent anterior poliomyelitis were more frequent than usual in the out-patient department and in the wards. Before the end of November twenty-five cases, all of which had developed within the past two months, were examined. Seventeen additional cases have been seen since then; making in all forty-two cases which will be reviewed.

*Read before the Winnipeg Medical Society, November 18, 1921

In 1920 fifty-four cases were reported to the Provincial Health Department. During the same period, forty-seven cases were reported to the City Health Department of Winnipeg. Of the fifty-four cases reported to the Provincial Health Department in 1920, forty-five were from Winnipeg, and nine from the country. In 1919, two cases were reported, one from the city and one from the country. In 1918, sixty-two cases; two from the city and sixty from the country. So far this year nineteen cases have been reported.

Examination of those reported to the City Health Department in 1920, shows that 25% of the cases died. Under one year there were three cases with no deaths. Between two and six years, thirty-two cases, with ten deaths. That is 83% of the deaths were between two and six years of age. This is the largest number of cases ever reported from the city in one year. It is likely that a larger percentage of the cases occurring are reported each succeeding year. However, as far as I have been able to discover, there have been no more cases during the last thirteen months than in any corresponding period in the history of the city.

Anterior poliomyelitis is an infectious disease. The lesions produced by the virus are most marked in the nervous system but they are present in other viscera as well. The cases analysed below are ones in which paralysis developed. I know nothing of the cases which occurred in which paralysis did not develop. Evidently there are many such. A study of the cases actually examined in the Children's Hospital and in practice is as follows:

*Seasonal Influences.*—89% of the cases developed during the months of September, October, November, and December. 54% during October and November. Of those reported to the City Hall in 1920, 70% occurred in October.

*Sex.*—43% of those affected were males, and 57% were females.

*Age Incidence.*—The youngest child seen was eleven months old, and the eldest twelve years. 47% of the cases were under three years and 76% under six years of age.

*Sociological.*—Four cases were from the farm. All the other cases were from homes of people in very humble circumstances, some of them very poor. There were no two cases in the same family. There were sometimes two or more cases in the same community.

*Distribution of the paralysis.*—The muscles of the neck were markedly affected in four cases. One or both of the upper limbs was affected in 25% of the cases, chiefly the deltoid. In no cases were the muscles controlling the elbow affected. Both lower limbs were affected in 28% of the cases. Where one lower limb alone was affected paralysis was 1½ times more common in the left than in the right.

*Symptoms.*—The most common symptom complained of was headache; the next fever with a temperature of 101°; occasionally, 104° or 105° Gastro-intestinal disturbances were common, vomiting being frequent in the early stage of the disease. Pain in the back and limbs, was in some cases very severe, causing the child to cry out when touched or moved. Pain in one leg may simulate very closely that of scurvy or acute osteomyelitis. Occasionally the illness was ushered in by a convulsion. In one case a partial paralysis of the muscles controlling the right ankle was the first thing noticed. The trunk muscles, particularly the abdominal, were affected in many cases. The muscle most frequently paralysed was the tibialis anterior. In the cases in which the blood was examined (only few in number) there was no leucocytosis. The largest number of white cells found was 9,000. The smallest number 6,600. The average 7,700. The average number of polymorphs was 60% and lymphocytes 35%. There were only a few examinations made of the spinal fluid. The fluid was reported to be under pressure. The pressure, however, was not accurately measured, and the observation is of little or no value. In only one were the cells increased. No electrical tests were made. No case gave a history of retention of urine. In those cases where the abdominal muscles were paralysed, constipation was a troublesome symptom.

*Prognosis.*—Of the cases reported to the City Hall 25% died. 7% of the cases seen in consultation died. One post mortem examination was made. This case is of some interest. It was severe, the neck and trunk muscles were badly affected, as were the right upper and both lower limbs. The child was making good progress towards recovery when an irregular was called in. He gave her heavy massage of the back seven weeks after the onset of the disease. She developed meningeal symptoms and died. The regular physician would not sign the death certificate; hence the post mortem. As regards permanent paralysis prognosis is difficult. In some cases a year has passed and certain muscles are still paralysed. Jones says that a muscle which

is absolutely paralysed after twelve months may be regarded as hopeless.

*Treatment.*—A few notes about treatment during the acute and early convalescent stages. Cases were isolated for three weeks. Nasal discharges burned. A laxative given. Easily digested food provided. Also plenty of water. The first essential of treatment is absolute rest. The patient should be put to bed, and kept there for a period, ranging from three to eight weeks, according to the severity of the symptoms and the damage done. On this point Sir Robert Jones in an article in the *British Medical Journal*, February 5, 1921, says: "We do not know enough of infantile paralysis in spite of the investigations that have recently been made by Flexner, Clark, Osgood and Lovett, but we have sufficient knowledge to treat it as a dangerously infective disease which should involve placing the family in quarantine and guarding the healthy children as strictly as they would be guarded against any other acute infectious disease. The early treatment of infantile paralysis is in the hands of the family doctor. Treatment should be undertaken at once, and should consist of complete rest of the nerves and muscles. I should make it a rule in every case, whether pain is present or not, to keep the head and spine at rest just as if we were treating an inflamed area. During both the acute and early convalescent stage the treatment should be protective, and this term should include the prevention of postural errors such as tend to give an initial bias towards deformity."

Dr. R. W. Lovett in the *Journal Surgery Gynecology and Obstetrics*, January 1921, says: "I am a firm believer in the need of rest in the early stages and so long as weakened muscles are improving under treatment."

Dr. A. Myers in making personal observations of the early treatment of 1,000 cases of infantile paralysis says: "that the greatest fault is the use of electricity instead of absolute rest in the early stages." Pain must be relieved, if necessary, by morphine. The next thing to which we must give very careful attention is posture. Every case must be studied in detail and dealt with according to its special requirements. The principle which should guide us in this is, that a paralysed muscle should be relaxed and placed in a position of rest. There is a definite relation between the final type of paralysis and the routine daily position. The position most favourable to recovery and the prevention of deformities is best maintained by the use of suitable splints. Sometimes plaster of Paris is necessary. When sponging the patients or changing the bed linen care must be taken not to stretch weak muscles. For example, if the trunk muscles are hit, the patient should not sit up, or if the deltoid is affected the arm should not be allowed down by the side. When splintsa re used, care must be taken that pressure sores do not develop. Where straps or bandages are used to hold a limb in a splint, the muscles themselves should be free of all pressure. Patients should be kept warm. Particularly when having treatment. If proper methods to prevent deformities are adopted during the acute and early convalescent stage of the disease, the period of recovery will be shortened and much operative treatment avoided. The use of the Violet rays, electric vibrator and many other popular methods of treatment are of doubtful value. Moreover, they are generally very costly, and, as most of these cases are in humble circumstances, it is customary to advise them not to waste their money on forms of treatment which are expensive and will do little good. How to handle some of these patients is a very difficult problem. Treatment is prolonged and progress towards recovery slow. Patients are apt to become discouraged, accept the advice of every busybody in the community, and finally give up treatment altogether. Massage and re-educative training should not commence until after pain has entirely disappeared. When such treatment is begun, we must be careful not to overtax weakened muscles. The paralysed limb must be kept warm. A cold muscle will not work well. When the patient gets up the amount of exercise allowed must, at first, be very small, and increased slowly. Never exercise to the point of fatigue. Muscles can be injured by too vigorous and prolonged massage as well as by overwork. Massage and muscle training should be carried out by one specially trained for the work.

*In Conclusion.*—Let me point out that cases of anterior poliomyelitis should be followed up, and not permitted to drift after the acute stage is past. All of these cases if properly treated can be made self-supporting and an asset instead of a liability to the state.

# PANCREATIC EXTRACTS IN THE TREATMENT OF DIABETES MELLITUS

PRELIMINARY REPORT BY F. G. BANTING AND C. H. BEST, *Dept. of Physiology*
J. B. COLLIP, *Dept. of Path. Chemistry*
W. R. CAMPBELL AND A. A. FLETCHER, *Dept. of Medicine, University of Toronto, and Toronto General Hospital*

SINCE the year 1889, when von Mering and Minkowski (1) produced severe and fatal diabetes by total removal of the pancreas in dogs, many investigators have endeavoured to obtain some beneficial effect in diabetes mellitus, either by feeding pancreas, or by administration of pancreatic extracts.

Minkowski, Sandmeyer (2), Pfluger (3) and others found that feeding pancreas was followed by negative or even harmful results. More recently, Murlin (4), Kleiner (5) and Paulesco (6) have tried the effects of aqueous extracts of the pancreas intravenously, on depancreatized animals and have found transitory reduction in the percentage of blood sugar and in the sugar excreted in the urine.

In 1907, Rennie and Fraser (7), recognizing the possibility that pancreatic enzymes might have harmful effects on the internal secretions, secured islet tissue from teleosteal fishes, where it exists separately from the rest of the pancreas, and fed it to human diabetics. Their studies demonstrated no beneficial influence on the condition of the patient. E. L. Scott (8) in 1912 sought to eliminate the influence of proteolytic enzymes by using alcoholic extracts of the pancreas. He did not find, however, that such extracts caused as marked a reduction in the urinary sugar or in the G-N. ratio as when extracts were made with acidulated water. The whole question has been reviewed recently by Allen: (9), by him, and, indeed, by the majority of recent writers, it is usually stated that pancreatic extracts have no clinical value whatsoever. During the past ten months, two of us (F. G. B. and C. H. B.), working in the Department of Physiology of the University of Toronto, have reinvestigated the problem. Certain of the results obtained have already been published, (10) others are now in press. These may be briefly reviewed here.

Believing that extracts of the pancreas, as usually prepared, did not satisfactorily demonstrate the presence of an internal secretion acting on carbohydrate metabolism, because the active principle was destroyed by the digestive enzymes also present in such extracts, attempts were made to eliminate these enzymes. In the first experiments, this was done by taking advantage of the fact that the acinous tissue (from which the digestive enzymes are derived) but not the insular tissue of the pancreas degenerates in seven to ten weeks after ligation of the pancreatic ducts. Extracts were therefore made with ice-cold Ringer's solution, of degenerated pancreatic tissue removed ten weeks after the ligation of the ducts. The extract obtained by this procedure, when injected intravenously or subcutaneously into diabetic dogs, invariably caused a marked reduction in blood sugar and in the amount of sugar excreted in the urine. It also enabled a diabetic dog to retain a much higher percentage of injected sugar than it otherwise would. Extracts of liver or spleen, prepared in the same manner as the extracts of degenerated pancreas, were found to have neither of these effects. The active principle of the extract of degenerated pancreas was destroyed by boiling in neutral or acid solution or by incubating for two hours at body temperature with pancreatic juice.

In later experiments, it was found that the pancreas of foetal calves of under five months development did not contain proteolytic enzymes, thus confirming the observations of Ibrahim (11). By extracting such foetal pancreatic tissue, a highly potent and readily procurable preparation was obtained. Besides affording a much more practicable method for securing larger quantities of extracts, this result demonstrated that the active principle is essentially the same from whatever animal it is prepared. A method

was finally evolved by which an active extract, which would retain its potency for at least one month, could be obtained from normal adult ox pancreas. Daily injections of pancreatic extract (foetal calf or adult beef pancreas) prolonged life of a completely diabetic dog to seventy days, at the end of which time the animal was chloroformed. Allen states that in his experience completely diabetic dogs do not live more than fourteen days. The first results of a study of the respiratory exchange in completely diabetic dogs, before and after administration of extract, showed that the extract confers on the diabetic animal the power to burn carbohydrates. Thus, in a diabetic dog, on starvation or lean meat diet, the respiratory quotient was found to be in the neighborhood of 0.7. The ingestion of carbohydrate caused no rise in the $\frac{C02}{02}$ ratio, but when preceded by an injection of extract gave a value which approached I.O., indicating that carbohydrate was being burned. Besides the above, it should be recorded that the administration of extract very quickly caused striking improvement in the various symptoms known to be characteristic of complete pancreatectomy.

As the results obtained by Banting and Best led us to expect that potent extracts, suitable for administration to the human diabetic subject, could be prepared, one of us (J. B. C.) took up the problem of the isolation of the active principle of the gland. As a result of this latter investigation, an extract has been prepared from the whole gland, which is sterile and highly potent, and which can be administered subcutaneously to the human subject. The preparation of such an extract made possible at once the study of its effects upon the human diabetic, the preliminary results of which study are herein reported. The extract containing the active principle is being further purified and concentrated. A detailed report of the method of extraction, purification and concentration will be published at an early date.

For the investigation of the clinical application of these extracts in the treatment of human diabetes, Professor Graham has placed at the disposal of two of us (W. R. C. and A. A. F.) the cases of diabetes mellitus in the wards of the Medical Service of the Toronto General Hospital.

Patients were placed on a constant diet, varying with the severity of each individual case, and their reaction to such treatment studied for a period of a week, after which various samples of extract were administered and the effects observed. The ordinary routine clinical examinations were carried through. Blood sugar was estimated at intervals by the revised Folin-Wu method, urinary sugar by Benedict's methods, the acetone bodies by Van Slyke's methods, and the respiratory quotient by the Tissot-Haldane and Douglas-Haldane methods.

Up to the present time, February 22nd, 1922, the effects of these preparations have been observed in seven cases of diabetes mellitus and it is now evident that certain definite results can be obtained by their administration. The effects observed in depancreatized animals have been paralleled in man. The fall in blood sugar occurs and in two cases, repeatedly examined, a rise in the respiratory quotient, indicating carbohydrate utilization, occurs more or less coincidently with the attainment of a normal blood sugar level. Patients report a complete relief from the subjective symptoms of the disease. The sugar excretion shows marked decrease or, if dosage be adequate, disappears. Ketonuria is abolished, thus confirming a similar observation by Collip in diabetic animals, (results as yet unpublished). These results taken together have been such as to leave no doubt that in these extracts we have a therapeutic measure of unquestionable value in the treatment of certain phases of the disease in man. In agreement with observations of other investigators on laboratory animals, it has been found that without careful control severe toxic reactions may be encountered and this will undoubtedly be a factor in the evaluation of the ultimate therapeutic utility of the method.

The following case report illustrates these observations:

*Name.*—L. T. (Boy), *Aged*-14

*Admitted* to the Medical Wards, Toronto General Hospital, December 2nd, 1921.

*Present Illness.*—About December 1919, he was taken to his family physician because he had been wetting the bed at nights, and also because his ankles became swollen occasionally. One month later, sugar was found in the urine. He states that at this time he was in good health, his appetite was somewhat excessive, but no increased thirst was complained of. Careful dietetic regulation was prescribed and he states that he adhered to this diet fairly well. This his family physician will not confirm. Fasting was also tried apparently without success. The glycosuria persisted, he began to lose weight, fre-

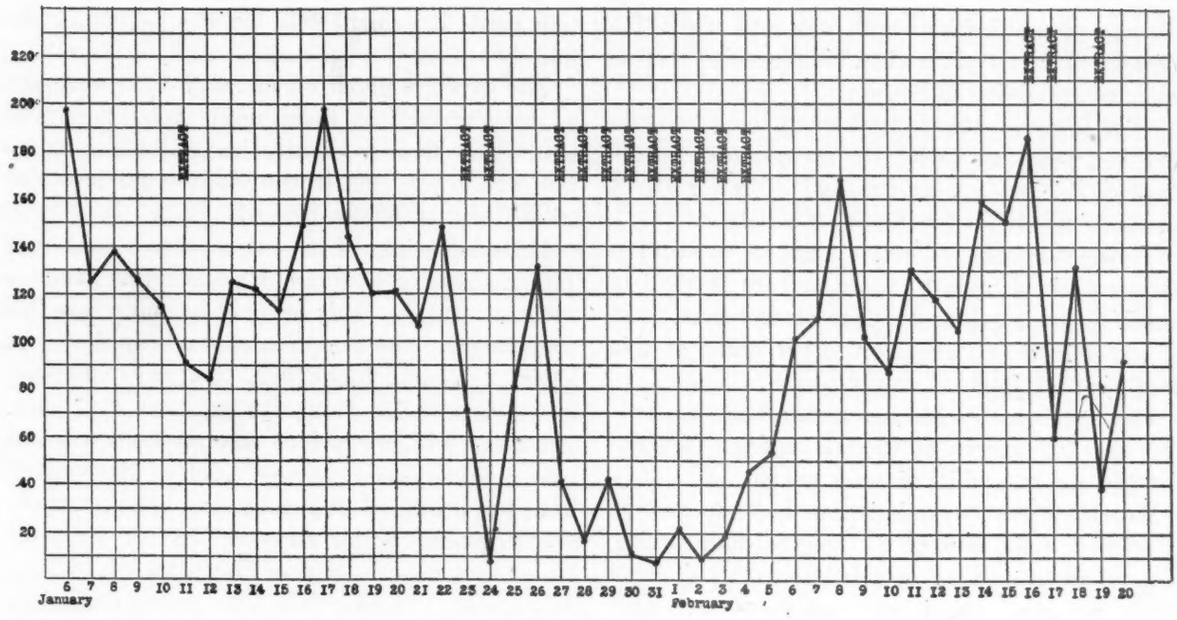


CHART I.—*Effect of extract on glycosuria*

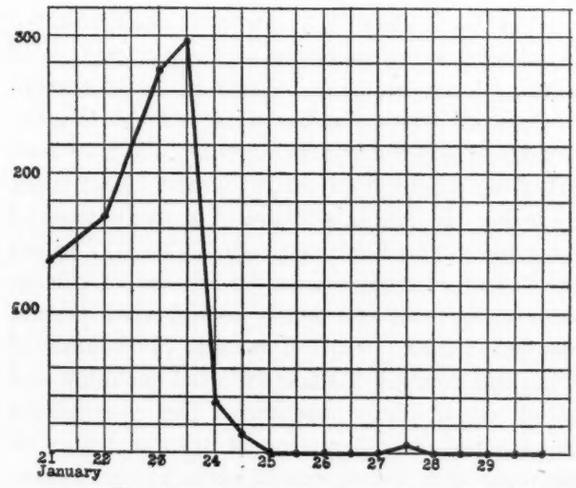


CHART II.—*Showing the cessation of ketonuria following administration of extract*

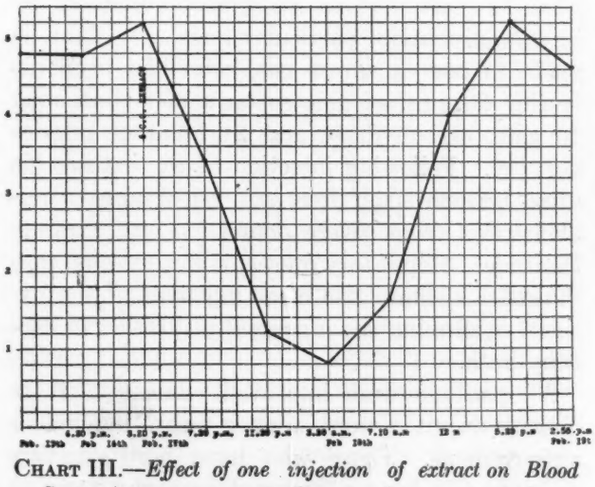

CHART III.—*Effect of one injection of extract on Blood Sugar (mgs. per c.c.e=tenth per cent)*

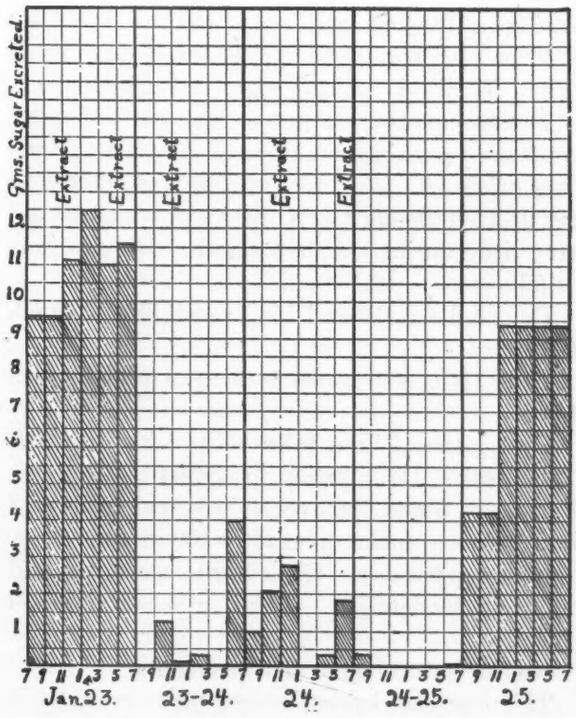


CHART IV.—*Curve of glucose excretion during extract administration. Large dots indicate blood sugar*

quency of micturition, both day and night, increased up to the time when his physician recommended admission to hospital.

*Past Illness.*—Always healthy up until two and one half years ago, with the exception of an attack of chicken-pox at the age of ten and, of discharging ear for two years as a baby.

*Personal History.*—Born in Canada, went regularly to school, able to work well up to time of onset of present illness. Has always been fond of sweet food and previous to the onset of this condition ate freely of candy.

*Family History.*—Mother and father, one brother and two sisters, all in good health. No diabetes or other familial diseases known.

*Examination.*—On admission he was poorly nourished, pale, weight 65 pounds, hair falling out, odour of acetone on the breath, tonsils and teeth in good condition, abdomen large and tympanitic. Blood pressure 100-70. He appeared dull, talked rather slowly, quite willing to lie about all day. Hands show marked xanthochromia. No findings of note in examination of cardio-vascular, respiratory, abdominal systems or of the blood. The urine at the time of admission was strongly acid, specific gravity 10.30 to 10.40. The test for sugar strongly positive. Rothera and ferric chloride tests for ketones strongly positive. 24 hours amount of urine, 3-5 litres. Blood sugar 5.8 mg. per c.c.

*Treatment.*—He was put to bed and was quite content to remain there most of the time. However, when he wished to do so, he was allowed to get up and wander about the ward, which he did very little during the first month. His diet was as follows:—

Dec. 2nd.—5, 10 and 15% vegetables as much as desired.

Dec. 11th.—60 grams lean meat daily added to diet.

Dec. 15th.—4 bran cakes daily added to diet.

Jan. 4th.—Daily ration to consist of 50 grams lean meat, 5 and 10% vegetables, and fruits and bran cakes to make up exactly 100 grams of carbohydrates per day. Clear broth, cocoa, tea and coffee in moderation. Total intake about 450 calories.

No further change in diet was made.

This case was one of severe juvenile diabetes with ketosis. Previous to admission, he had been starved without evident benefit. During the first month of his stay in hospital, careful dietetic regulation failed to influence the course of the disease and by January 11th his clinical condition made it evident that he was becoming definitely worse.

The extracts given on January 11th were not as concentrated as those used at a later date, and, other than a slightly lowered sugar excretion and a 25% fall in the blood sugar level, no clinical benefit was evidenced.

Daily injections of the extract were made from January 23rd to February 4th (excepting January 25th and 26th). This resulted in immediate improvement. The excretion of sugar as shown in Chart I became much less. On days of treatment, this varied from 7.5 gms. to 45.1 gms. compared with a previous amount well over 100 gms. daily. The acetone bodies disappeared from the urine. The boy became brighter, more active, looked better and said he felt stronger. No extract was given from February 5th to February 15th. During this time sugar again appeared in the urine in large amounts along with traces of acetone. Administration of extract in smaller doses after February 16th again resulted in lowered sugar excretion and disappearance of acetone from the urine. Chart II shows the fall in the total acetone bodies of the urine during the periods of treatment after January 23rd. Chart III gives a four hour record of the blood sugar following the administration of a single dose of 6 c.c. extract on February 17th. Chart IV shows the influence of extract on the amount of glucose excreted in each two hourly period when extract was being used. Table I records the volume of urine and amount of sugar excreted each day and blood sugar determinations. The qualitative test for the daily excretion of acetone bodies in the urine and the amount of extract given is also tabulated.

Although the other six patients treated by these extracts were all favourably influenced by its administration, particular reference might be made to one—a severe case who had been excreting 20 gms. of glucose on a diet containing 10 gms. carbohydrate and 24 hundred calories per day. Following injection of the extract his urine became sugar free, and he obtained complete relief from severe depression and extreme lassitude. Repiratory quotients in this same case showed a definite rise after injection of the extract, confirming the increased utilization of carbohydrate.

All patients were improved clinically. It is difficult to put in words what is meant by clinical improvement. Those who have been treating diabetes will have recognized as early signs of

improvement a certain change in the skin, the appearance of the eyes, the behaviour of the patient, his mental and psychic activity, and the physical evidences, as well as his testimony, of increased vigor and desire to use his muscles. Under present day treatment, such improvement occurs in diabetics free from acetone but is undoubtedly more striking in patients recovering from a ketosis. This is the nature of the improvement seen clinically as a result of the administration of these extracts, and, while it is of a temporary nature, we believe that it justifies the hope of more permanent results following more adequate and carefully regulated dosage.

TABLE I.

| Date | 24 hr. amount of urine in c.c. | 24 hr. excretion of glucose in gms. | Blood Sugar in mg. per c.c. | Rothera Test | Total acetone bodies in mgs. per litre | Subcutaneous injection of pancreatic *extract in* c.c. A.M. | P.M. |
|---|---|---|---|---|---|---|---|
| Dec. 12th | .... | .... | 5.8 | plus plus | .... | .... | |
| 20th | .... | .... | 4.5 | plus plus | .... | .... | |
| 29th | .... | .... | 5.2 | plus plus | .... | .... | |
| Jan. 3rd | .... | .... | 5.2 | plus plus | .... | .... | |
| 6th | 4500 | 187.8 | .... | plus plus | .... | .... | |
| 7th | 4020 | 126.2 | .... | plus plus | .... | .... | |
| 8th | 3650 | 137.2 | .... | plus plus | 72 | .... | |
| 9th | 3690 | 126.7 | 6.2 | plus | 540 | .... | |
| 10th | 6870 | 114.0 | .... | plus plus | .... | .... | |
| 11th | 3625 | 91.5 | 3.2–4.4 | plus plus | 188 | | 15 c.c. |
| 12th | 4060 | 84 | 4.9 | plus plus | 69 | .... | |
| 13th | 3950 | 125.5 | .... | plus | .... | .... | |
| 14th | 3780 | 123.5 | .... | plus plus | .... | .... | |
| 15th | 3900 | 114.7 | .... | plus plus | .... | .... | |
| 16th | 3910 | 148.0 | .... | plus plus | .... | .... | |
| 17th | 3960 | 197.3 | 6.7 | plus plus | .... | .... | |
| 18th | 4300 | 144.6 | .... | plus plus | .... | .... | |
| 19th | 3770 | 120.6 | .... | plus plus | .... | .... | |
| 20th | 3840 | 121.9 | .... | plus plus | .... | .... | |
| 21st | 4580 | 107.3 | .... | plus plus | 137 | .... | |
| 22nd | 4540 | 148.5 | .... | plus plus | 167 | .... | |
| 23rd | 4210 | 71.1 | 5.2 | plus plus | 282 | 5 c.c. | 20 c.c. |
| 24th | 4120 | 8.7 | 1.2–3.0 | plus | 30 | 10 c.c. | 10 c.c. |
| 25th | 3880 | 80.5 | .... | 0 | 0 | .... | |
| 26th | 5070 | 130.3 | .... | 0 | 0 | .... | |
| 27th | 3040 | 42.2 | .... | plus | 4 | 4 c.c. | 4 c.c. |
| 28th | 5125 | 16.7 | .... | trace | 0 | 2 c.c. | 4 c.c. |
| 29th | 3275 | 42.5 | .... | 0 | 0 | 4 c.c. | |
| 30th | 2715 | 11.5 | .... | trace | 0 | 4 c.c. | 4 c.c. |
| 31st | 4415 | 7.5 | .... | 0 | 0 | 4 c.c. | 4 c.c. |
| Feb. 1st | 3145 | 21.8 | .... | 0 | 0 | 4½ c.c. | 4 c.c. |
| 2nd | 2700 | 9.1 | .... | 0 | 0 | 5 c.c. | 4 c.c. |
| 3rd | 4150 | 18.2 | .... | 0 | 0 | 5 c.c. | 4 c.c. |
| 4th | 3740 | 45.1 | .... | 0 | 0 | 5 c.c. | 4 c.c. |
| 5th | 3475 | 53.3 | .... | 0 | 0 | .... | |
| 6th | 3900 | 101.5 | .... | 0 | 0 | .... | |
| 7th | 3700 | 110.1 | .... | 0 | 0 | .... | |
| 8th | 4910 | 167.1 | .... | trace | 0 | .... | |
| 9th | 4940 | 101.7 | .... | 0 | 0 | .... | |
| 10th | 4710 | 86.9 | .... | trace | 0 | .... | |
| 11th | 4510 | 129.9 | .... | trace | 0 | .... | |
| 12th | 3170 | 117.7 | 4.87 | trace | 0 | .... | |
| 13th | 2595 | 106.7 | 4.9 | trace | 0 | .... | |
| 14th | 4670 | 158.5 | .... | trace | 0 | .... | |
| 15th | 3275 | 151.4 | .... | trace | 0 | .... | |
| 16th | 4611 | 185.0 | 4.73 | neg. | 0 | | 5 c.c. |
| 17th | 3930 | 60.4 | 0.85–5.2 | neg. | 0 | | 6 c.c. |
| 18th | 4790 | 132.3 | 2.0–4.5 | neg. | 0 | .... | |
| 19th | 3105 | 39.6 | .... | neg. | 0 | | 4 c.c. |
| 20th | 3985 | 92.0 | .... | neg. | 0 | .... | |

## SUMMARY

Following the production of what appears to be a concentrated internal secretion of the pancreas and the demonstration of its physiological activity in animals, and, under careful control, its relatively low toxicity, we are presenting a preliminary report on the pharmacological activity of this extract in human diabetes mellitus. Clinical observations at this juncture would appear to justify the following conclusions:—

(1) Blood sugar can be markedly reduced even to the normal values.

(2) Glycosuria can be abolished.

(3) The acetone bodies can be made to disappear from the urine.

(4) The respiratory quotient shows evidence of increased utilization of carbohydrates.

(5) A definite improvement is observed in the general condition of these patients and in addition the patients themselves report a subjective sense of well being and increased vigor for a period following the administration of these preparations.

For their hearty co-operation and kindly assistance and advice, we have great pleasure in presenting our best thanks to Professor J. J. R. MacLeod of the Department of Physiology, to Professor V. E. Henderson of the Department of Pharmacology, to Professor J. G. Fitzgerald of the Department of Hygiene, and to Professor Duncan Graham of the Department of Medicine of the University of Toronto.

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**New Opium Laws in Great Britain.**—In compliance with the agreement at the Hague International Opium Convention in 1912, Great Britain in 1920 adopted a law for the regulation of traffic in narcotic drugs. This bill would doubtless have been adopted long before, had t not been for the war. The regulations under the act went into effect September 1. "As originally drafted by the Home Office," says the *British Medical Journal* editorially, "they were open to much legitimate criticism; but after emendations by a departmental committee, in accordance with the recommendations of the British Medical Association, these are now in a form better calculated to achieve the end desired without impeding the legitimate use of the drugs in question." In addition to the international agreement under the Hague Convention, the Versailles treaty creating a league of nations, contained a paragraph pledging all of the powers that were signatories to the treaty to enact effective laws for the regulation of dangerous drugs within twelve months from the time that these treaties went into effect. The advisory committee appointed by the Council of the League of Nations will present a report at the assembly of the league in Geneva this month, summarizing the action taken by the various nations. The advisory committee, on the initiative of Dr. Wellington Koo, Chinese minister to Great Britain, proposes to undertake investigations to ascertain approximately what amount of opium, morphin and cocain is required for legitimate medical purposes, with a view to inaugurating international methods for restricting the manufacture of these drugs to the amount necessary for medical and scientific requirements. It has been generally recognized by those interested in the regulation of narcotic drugs that this problem could never be satisfactorily solved except through general international agreement and co-operation. Restriction of the growth and manufacture of these drugs to the amount necessary for legitimate needs, and international co-operation for the prevention of smuggling across boundary lines, are the most essential features in any plan for the control of this traffic The problem is world-wide, and the co-operation of all civilized nations is essential for its solution.—*Jour. A. M. A.*, Sept. 24, 1921.

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WE understand that a bust of Dr. W. T. G. Morton, the discoverer of anæsthesia, will be placed in the Hall of Fame. At the annual dinner of the American Anæsthetists Dr. S. A. Knopf proposed that the price should be contributed in great part by the anæsthetists of America, and urges those who are interested to make a contribution.

# THE BLOOD CHOLESTEROL, ITS IMPORTANCE, AND THE VALUE OF ITS DETERMINATION IN CANCER RESEARCH*

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THE cancer problem is undoubtedly one of the greatest problems of civilisation and its solution of the utmost importance because of the innumerable victims of malignant growth. The value of studying the functional efficiency of the body structures, rather than their morphologic appearance, has been recognized in many fields of modern medicine. It is no longer a matter of debate that, in diabetes, for instance, histologic examination gave but little information, even when the pancreas itself was studied, whereas the chemical analysis of the blood and the urine not only revealed the nature of the disease, but insured a far more successful treatment.

The life of every cell in the body depends upon its blood supply; this is universally conceded. The blood is practically the only food supply to which the cells have access. It contains numerous chemical constituents: proteins and their derivatives, glucose, inorganic salts, and lipoids, such as lecithin and cholesterol. It is obvious that the relative proportions in which these chemical constituents are present in the blood will play an important part, not only with regard to the general welfare of the body as a whole, but also of the individual cell units.

The blood cholesterol, one of the chief blood lipoids, deserves special consideration because it is intimately associated with the problems of growth and cell proliferation and of resistance to bacterial invasion.

Cholesterol appears to be a substance which the body cannot afford to be deprived of, for Dezani's experiments showed that mice fed on an entirely cholesterol-free diet succumbed after apparently synthesizing cholesterol for a short time; cholesterol was found in the feces during the cholesterol-free diet, the mice increased in size and weight, and their total cholesterol content augmented by one-third, but they all died at the end of seventeen days. Since all animal cells contain some cholesterol, and practically all the staple foods as well, though in varying amounts, a total cholesterol deficit is not likely to occur in the human body. Reserve deposits of cholesterol occur moreover in the body fat, the brain, the suprarenal cortex, and the liver, so that the synthesis of cholesterol must be looked upon as an emergency measure, under strictly experimental conditions, which it would be difficult to duplicate in every-day life.

*Cholesterol and cell proliferation.* It has been shown by the work of Dorée, Ellis, Gardner, Fraser and Lander, of Browder, and of Robertson and Burnett, that cholesterol takes an active part in cell proliferation. Whether it acts as a catalyzer, as Robertson and Burnett have suggested, or whether it is merely used up as building material in the formation of cells is not known definitely. The experiments of Ellis and Gardner, who incubated hen's eggs for different periods and showed by determinations that the cholesterol content of the egg yolk diminished parallel with the increase of the volume of the chick embryo, make it seem probable that cholesterol is used directly for the manufacture of cells. Robertson and Burnett in experimenting with tumour-grafted rats, showed that intravenous injections of cholesterol in sodium oleate cause the tumours in the injected animals to grow twice as fast as in the controls, all the rats having been grafted at the same time and with the same tumour.

*Investigations of the writer.*—The fact that in Robertson and Burnett's experiments on rats the injected cholesterol was manifestly carried to the tumour cells by the blood, because the injections were made intravenously on the side of the animals as far removed from the graft as possible, led me to investigate the cholesterol content of the blood in malignant conditions, and to study the factors which might influence the blood cholesterol. The problems involved proved far more

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numerous and more complex than I had anticipated. Between 1915 and 1921 more than 3,000 samples were analyzed for cholesterol. The samples comprised the blood of human beings in health and in disease and under experimental conditions; the blood of goats, gophers, dogs and rabbits; blood taken at necropsy, several hours after death, and pus, bile and foodstuffs. Since two determinations at least were made on every sample the series represents between 6,000 and 7,000 determinations.

*Cholesterol and bacterial infection.*—If the cholesterol content of the blood promotes the multiplication of cells by some as yet unexplained mechanism, it may be said to have the opposite effect on the growth of pathogenic bacteria. Manfredi showed that the addition of cholesterol to the culture medium (agar-agar) completely inhibited the growth of many pathogenic bacteria if a concentration exceeding 50:10,000 was used. Concentrations of 20:10,000 had an inhibitory effect in the majority of cases, although *Bacillus prodigiosus*, *Bacillus typhosus*, and *Staphylococcus aureus* managed to thrive even in these concentrations. Concentrations exceeding 10:10,000 greatly reduced the growth of many types of bacilli and streptococci (*Bacillus puerperalis*, *Bacillus diphtheriae*, *Streptococcus erysipelatis*) and of the cholera spirillum. Manfredi's observations have recently been corroborated by the clinical investigations of Sisto, who found a constant cholesteremia in typhoid fever, which only receded during convalescence, a marked increase of the blood cholesterol in pneumonia at the onset of the disease, but inconstant findings in pulmonary tuberculosis, exacerbations being accompanied by a rise in the blood cholesterol values. I was able to observe an increase of the blood cholesterol at the onset of symptoms in several patients during the epidemics of influenza in Rochester in 1918, 1919 and 1920. Low blood cholesterol values prevail, on the contrary, in chronic bacterial infections such as tuberculosis, when there is no temporary exacerbation, and in syphilis. It is interesting in this connection that erysipelas has been known to exert a curative influence in malignant conditions, and that Coley's treatment, by which a cure has been wrought in 10 per cent of the cases treated, consists of injections of *Bacillus prodigiosus* and *Bacillus erysipelatis*.

*The value of blood cholesterol determinations.*—The test for cholesterol in the blood is not a diagnostic test. This must be borne in mind. It is comparable in this respect with many valuable clinical tests, for example, the Wassermann test, and the test for albumin in the urine. Thus, in blood cholesterol determinations, the detection of high cholesterol values accompanied by "gallstone symptoms" does not give conclusive evidence concerning the presence or the absence of stones. although gallstones contain from 80 to 95 per cent cholesterol and are crystalization products of the cholesterol in the bile. Since the liver carries about one third of the total blood volume and the bile is furnished by the liver, the cholesterol content of the blood must influence the cholesterol content of the bile. But, as Rothschild and Rosenthal have pointed out, in cases of cholelithiasis three possibilities should be taken into account in the interpretation of the blood cholesterol values: (1) high blood cholesterol values, no stones being found at operation because the gallstones have not had time to form; (2) low blood cholesterol values accompanied by the finding of stones at operation, which indicates that the cholesterol content of the blood has been reduced because the cholesterol was used for the iormation of stones; and (3) high blood cholesterol values and stones in the gallbladder, showing that an opportunity exists for the formation of more stones, especially if the high cholesterol values remain constant even after cholecystectomy. It is in the latter instance that determinations of the blood cholesterol are of special importance, because the persistence of high values shows that the patient is suffering from a more or less permanent impairment of cholesterol metabolism and because the cholesterol content of the blood can be reduced by dietary measures, as Rothschild and Rosenthal have shown, and as I was able to corroborate by a series of dietary experiments on myself. (Fig. 1.) It is not surprising that eggs should further cholesteremia: the cholesterol concentration of the egg yolk is roughly ten times that of normal human blood, 900 mg. per 100 c.c. It is not easy to understand, however, why meat should increase the blood cholesterol to a marked extent, as the cholesterol content of meat is very much lower than that of eggs, and the cholesteremia produced by a diet consisting of Scotch oatmeal exclusively would be wholly inexplicable but for the work of Howard Mueller, because oatmeal contains no cholesterol whatever. Mueller showed that both in vivo and in vitro the chemical character of cholesterol is changed by the influence of the bile and of the pancreatic juice. Bile transforms about one-

third of a given amount of cholesterol into cholesterol esters; pancreatic juice converts two-thirds of the cholesterol into esters, but the combination of bile and pancreatic juice causes the esterification of the total amount of cholesterol. It seems possible that an excess of carbohydrates, by overworking the pancreas, may prevent the proper esterification of the blood cholesterol and its subsequent elimination, with a resulting increase of the cholesterol concentration in the blood such as I observed during my oatmeal diet. All the problems involved in the relation between the diet and the blood cholesterol cannot be discussed here; these problems are numerous and intimately connected with the relative efficiency of the pancreas, the liver, the adrenals, and other glands which are concerned in cholesterol metabolism. From a practical point of view it would seem a safe proceeding, however, to advise patients suffering from hypercholesteremia to reduce the intake of eggs, meat, oatmeal, and of cholesterol-rich fish, black bass and salmon, and to use, temporarily, at least, a diet composed chiefly of fruit, vegetables, and milk, blood tests being made to check the effect of the diet.

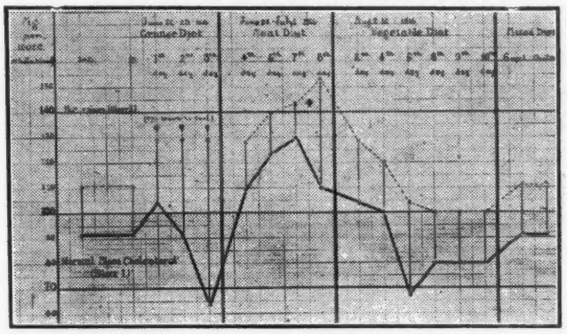

FIG. 1.—Cholesterol determinations on the writer' P.S. Personal cholesterol standard from January to June, 1916. The tests were made at irregular intervals and showed practically no variations. B. Test made on the day preceding the experimental diets.

*Gruner's diet.*— Milk and water, bread, lettuce. The Bloor II values (?) could not be determined, the colour reaction being brownish-green because of the great amount of "changed" cholesterol. The Bloor I values dropped rapidly. The Bloor I values are indicated by the solid line, the Bloor II values by the dotted line.

*Meat diet.*—Meat was used exclusively for every meal; only a very small piece of bread had to be taken "to help the meat down" towards the end of the experiment when meat became very repugnant. Attacks of diarrhea, lowering Bloor I but increasing Bloor II cholesterol value..

*Vegetable diet.*—Vegetables and fruit exclusively. Observe the drop of the Bloor I values and satisfactory amount of "changed" cholesterol (vertical line). No diarrhea intervened during the vegetable diet, but the blood cholesterol settled down to a lower level.

*Mixed diet.*—Meat twice a day, vegetables and fruit: usual type of mixed diet. The blood cholesterol returned to its former level. During all the dietary experiments coffee and tea were taken in the usual amounts. but as usual no alcohol.

*Experiments on animals showing stimulation of tumour growth by cholesterol.*—The dietary experiments of Corson-White on a large series of rats, all grafted with the same strain of a Flexner-Jobling adenocarcinoma, furnish conclusive evidence of the stimulation of tumour growth by cholesterol. Corson-White found that "diets which stimulate most markedly the growth of large tumours (after transplantation) give normal growth curves in normal rats, show a diminution of the number of lymphocytes in the circulating blood and a cholesterol content equal to or higher than normal," and that "those diets on which rats produced the most metastasis gave the highest (blood) cholesterol values." The experiments of Corson-White comprised two types of diets; a normal, adequate diet giving normal growth curves in the controls, and the inadequate diet (Mendel-Osborne) on which the animals remained in good condition but did not grow. Addition of cod liver oil, olive oil, and cholesterol to the normal, adequate diet produced a higher percentage of "takes" and more extensive metastasis (91 per cent) than the normal diet alone (87 per cent); but the addition of the cholesterol furnished the highest percentage of metastasis (94 per cent) in conjunction with the normal diet, and even produced metastasis (0.4 per cent) in combination with inadequate diets, which otherwise gave a small number of takes and seemed to inhibit the development of metastasis (Fig. 2).

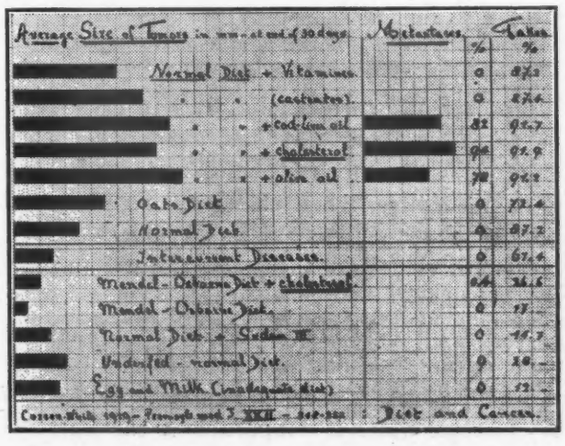

FIG. 2.—Corson-White's dietary experiments on rats grafted with the same strain of a Flexner-Jobling adenocarcinoma. Growth-stimulating diets above the central dividing line; inadequate, growth-retarding diets below the central dividing line. The number of takes and cases of metastasis is markedly increased by addition of cholesterol to the diet, and by the addition of cod liver oil and olive oil. According to Chauffard's observations, fats are transformed into cholesterol.

These findings fully corroborate the observations of Robertson and Burnett, (which formed the basis of Corson-White's work) of Rothschild, and my observations in experimental diets and on the blood of patients suffering from cancer. The stimulation of tumour growth by ingestion of olive oil and cod liver oil is explained by the investigations of Chauffard, Laroche and Grigaut, who found a marked increase of the blood cholesterol after the ingestion of fat, even when the fat contained no cholesterol. This suggests that there is an intra-organic synthesis of cholesterol from fat.

*Factors that influence the blood cholesterol.*—Cholesterol metabolism is regulated by the activity of several organs, namely, the liver and the pancreas; but the suprarenals, the gonads, and the thyroid may play an even more important part. The suprarenals are probably the chief regulators of cholesterol. The gonads might be termed the principal market for cholesterol, and it is not surprising that disturbances of cholesterol metabolism should be particularly likely to occur when the gonads are either heavily taxed by work, as in pregnancy, or when their activity is declining, as in the menopause. I need but mention the well-known "pregnancy gallstones" and the frequency of malignant growth when reproductive activity ceases. The thyroid has been called the "dynamo" and "the pacemaker" of the body (Crile), because of its influence on the basal metabolic rate. It would almost seem a foregone conclusion that the basal metabolic rate, the rate of burning in the body, should influence cholesterol metabolism, but blood cholesterol determinations were needed to show that this obvious conclusion is really correct (Fig. 3). In myxedema the basal metabolic rate and the blood cholesterol values are inversely proportional; in exophthalmic goitre, when the body engine, so to speak, is going at ninety miles an hour the blood cholesterol values are within the normal and low normal ranges.

Cholesterol determinations should always be made during the postdigestive period, that is, before breakfast, in order to eliminate the temporary increase which is comparable to the digestive leukocytosis. In our determination two tests are made routinely for every blood sample. In the first test (Bloor I method) only the pure or unchanged cholesterol is determined. The second test gives the value of both changed and unchanged cholesterol combined. The difference between the values found in the first test and in the second test (Bloor II method) represents the amount of changed cholesterol or cholesterol split-products, contained in the blood. It has been the use of this two-fold test which revealed anomalies of cholesterol metabolism in malignancy and furnished evidence that the beneficial effect of ra-

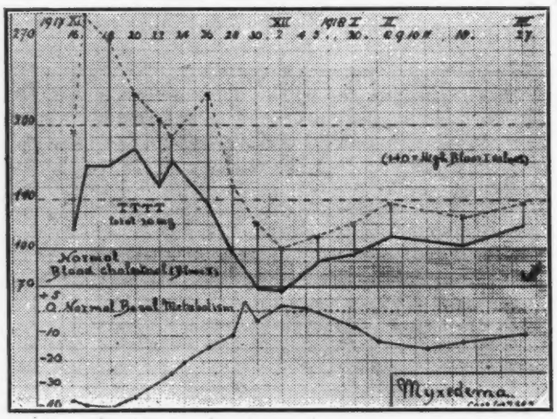


FIG. 3.—The inverse proportion between the basal metabolic rate and the blood cholesterol. The patient, who had a pronounced case of myxedema, became perfectly well after the administration of the thyroid hormone (T), Kendall's thyroxin, 5 mg. at each dose.

dium treatment is intimately connected with changes in the chemical composition of the blood (Luden).

*The anomalies of the blood cholesterol in cancer: the effect of radium.*—A two-fold disturbance of cholesterol metabolism is found in malignant conditions, and especially in carcinoma: namely, a tendency to cholesteremia, and a lack of cholesterol split-products in the blood. In other words, the body is not handling or burning its cholesterol as it should. The pure cholesterol may be fitly compared to fuel: unburnt fuel is eminently capable of starting a conflagration. The cholesterol split-products are comparable to consumed fuel, or ashes in a general sense; ashes are not suited to keep a fire burning. A comparative study of the blood cholesterol of seventy patients suffering from diverse types of cancer and of seventy patients suffering from non-malignant conditions showed that high cholesterol values predominate in carcinoma, being accompanied by a lack of cholesterol split-products in the blood, whereas in the non-malignant cases there was no lack of changed cholesterol and the high values were in the minority. After radium treatment the high values changed to medium, or inflammatory values, and the amount of split cholesterol in the blood was markedly increased; the lack of split-products disappeared altogether. The effect of radium on the blood cholesterol was strik-

ingly shown by observations in a case of lupus erythematosus, degenerating into carcinoma. Clinically, the lesions on the patient's nose were typical of lupus erythematosus, but treatment with blue light failed to have the ususal curative effect. The cholesterol tests revealed a total lack of split cholesterol, suggesting the presence of carcinomatous degeneration. Excision of a minute portion of the lesion and microscopic examination of serial sections confirmed this suspicion. Exposure to radium caused the lesions to disappear; cholesterol tests before and after exposure showed that improvement went hand in hand with the activation of cholesterol metabolism (Fig. 4). Two explanations are admissible with regard to the effect of radium on the blood cholesterol. Either the disintegration of the blood cholesterol is caused by the photo-active properties of the radium rays or by the stimulation of the organs that regulate cholesterol metabolism. The experiments of Schulze and

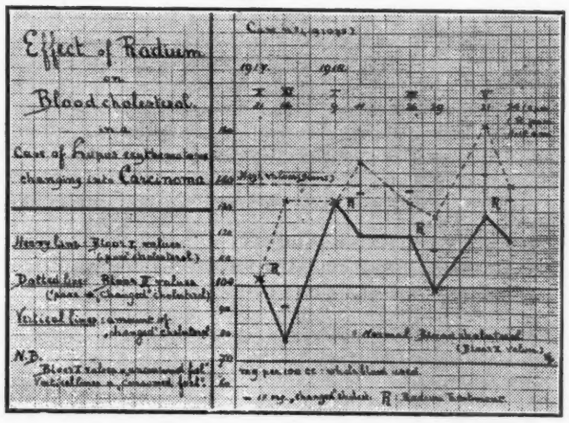


FIG. 4.—The effect of radium treatment on the blood cholesterol in Case 192075. The Bloor I values (heavy line) dropped and the changed cholesterol (vertical line) increased after each radium treatment (R). The small horizontal bar on the vertical denotes the normal minimum of changed cholesterol, 17 mg. per 100 c.c. of whole blood. At the patient's last visit to the Clinic, May 21, the lesion on the nose was barely perceptible, a large amount of changed cholesterol being present in the blood. One more radium treatment was given to complete treatment; the cholesterol determination May 24 was made three hours after exposure to radium.

Winterstein show that the photographic rays in ordinary daylight produce chemical changes in cholesterol in the test tube; but stimulation of the organs that regulate cholesterol metabolism, resulting in an increased activity of these organs, is strongly suggested by the chemical changes in the composition of the blood, perhaps by the so-called radium sickness, and certainly by the disappearance of metastatic tumours which were not exposed directly to the rays, but located at a considerable distance, the main tumour alone being treated with radium. I have been able to observe repeatedly that patients whose blood cholesterol values did not show changes "in the right direction" did not appear to derive as much benefit from radium treatments as patients in whose blood a marked increase of cholesterol split-products could be demonstrated. This suggests that dietary measures calculated to reduce the work of cholesterol metabolism in conjunction with radium treatment might enhance the effect of the radium treatment itself, the response of the patient being observed by blood cholesterol determinations.

Before closing I would like to call your attention to an established fact, which I think has received too little consideration, namely the spontaneous regression of malignancy observed in man. Rohdenburg has published a detailed account of 302 cases in which this phenomenon occurred; in roughly one-third of these cases a microscopic diagnosis was made and the subsequent history "carefully controlled." In every instance the condition of the patient had proved to be inoperable, "hopeless." No radium treatment had been given and such operations as had been performed are described as "palliative" or "incomplete." Yet tumours and metastasis disappeared and the patients became "clinically well." The importance of this fact can hardly be overestimated. It is proof positive that the human body can wage a winning fight against malignancy under the most untoward conditions. Changes in the body chemistry, resulting from increased or renewed activity of organs by which the chemical condition in the body are regulated, seems to be the only available explanation since the chemical composition of the blood must influence the body cells. If this be true, the cancer problem must be looked upon as a chemical problem and physiologic chemistry may be expected to furnish its ultimate solution. Much work remains to be done, but cholesterol determinations give some information, at least, concerning the efficiency of cholesterol metabolism in a given case; they help to ascertain the effect of dietary measures and the response of the patient's organism to radium therapy; and they may be expected to reveal the organ initially responsible for the disturbances of cholesterol metabolism which are connected with the lawless proliferation of cells found in malignant disease; hence the value of blood cholesterol determinations and their place in cancer research.

## Summary

1.—Cholesterol is an important chemical constituent of the blood.

2.—There is evidence that the blood cholesterol plays an important part by promoting cell proliferation and by combating bacterial invasion.

3.—The test for cholesterol in the blood is not a diagnostic test, but it furnishes valuable information concerning the efficiency of cholesterol metabolism.

4.—The activation of cholesterol metabolism after radium treatment demonstrated by the blood cholesterol determinations, and the parallel improvement of patients suffering from malignancy indicate that there is an intimate connection between disturbances of cholesterol metabolism and malignant disease.

5.—Cholesterol metabolism can also be improved by dietary measures, suggesting that beneficial effects may be expected from dietary measures tending to reduce the cholesterol intake with the food, combined with radium therapy.

6.—Since the life of the cells depends upon their blood supply, the chemical composition of the blood must be equally important; radium treatment changes the chemical composition of the blood, as is shown by blood cholesterol determinations.

7.—Spontaneous cures have been observed in well-authenticated, inoperable, "hopeless" cases of cancer: this proves that the body can wage a winning fight against malignant disease; as therapeutic measures had proved ineffective in these cases, some internal readjustment must account for the cures. Chemical investigations will solve the cancer problem by revealing the nature of this internal readjustment.


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# PROBLEMS OF CLINICAL INTEREST TO THE SURGEON AND RADIUM THERAPIST RELATING TO CANCER*

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PLANT life is remarkably influenced by radium emanation. The vine sprinkled with radioactive water, increases its growth almost twofold. A small amount of radium allowed to remain for half an hour in a box of seeds will cause the seeds to germinate much more promptly than control seeds not exposed to radium. Allow 100 milligrams of radium to remain in contact with the seeds ten or twelve hours, and but very few of the seeds will germinate at all—they are dead. Cancer commonly met in plant life can be attacked with radium and its cells destroyed. The stages of its destruction can be checked up by the microscope.

Such experiments to the casual observer may seem unimportant, yet they have proved an incentive to the radium therapist in his study of radiumized tissue, animal and human. It is an undeniable fact that radium rays destroy cancer tissue, and in a manner far more humane than by the surgeon's art. This statement must not bespeak a conflict with surgery, for we recognize in it the greatest weapon of service in the fight against cancer. The best surgery of the world is now being done, and still, in the last twenty years, cancer death rate has increased 30%. To-day we recognize that one in every eight of the women and one in every fourteen of the men must die of cancer: therefore we are called upon to encourage any therapeutic measure that may improve on the present methods. You will bear us out in the statement that there is prevalent among the laity an idea that the surgeon is antagonistic toward non-surgical methods of treatment of cancer. It is important that we correct immediately such an impression because it is not true. The surgeon, in duty to his patient, has been forced to stand out against a multitude of so-called cancer cures, that gain publicity in the secular press. Radium suffers from the unjust publicity it secures when announced as a cancer cure. Such reports exert an influence that works a hardship, first of all, on the cancer victim, secondly, on the general practitioner, and lastly, on the surgeon who is devoting his life to the study of cancer and its control.

Radium to-day is the most potent adjunct that the surgeon can command to strengthen his armamentarium in the battle against cancer. Fifteen years of critical trial has proven this statement: in witness of such fact we see fourteen municipal centres in England with public owned radium, Germany with nine vast radium clinics, Japan with its Imperial Radium Institute, and even the Philippine Islands has a government owned clinic. Recently the State of New York invested in a quarter of a million dollars' worth, for the free use of its people. The surgeon must standardize measures of treatment that are for his support.

At the last meeting of the New York State Medical Society, the surgical section presented no paper on radium: it was not recognized. Recently, at the last session of the American Medical Association, in the section on Gynecology, a prominent surgeon stated that although his "mind was open and he was quite far visioned, he had never seen a single case of primary cancer of the cervix cured by radium." The applause which greeted this statement was so prolonged and enthusiastic that it gave no reason for doubting the attitude of the entire assemblage—more than 400 of America's best surgeons—they had spoken and at the same time acknowledged a degree of ignorance.

Radium has a place: at times it can be used helpfully, and at times its use should be discouraged. The public is informed through the press, and looks to you for advice. That radium does not always control or destroy outlying metastases or new growth advance, must not be charged against radium.

We would have little sympathy with a person who would fail to use specific treatment on the appearance of a chancre simply because he had seen such treatment administered and the primary sore healed, but subsequently, the disease spread like

*Address before the Montreal Medico Chirugical Society, May 20th, 1921.

wild-fire. The radium worker is treating cancer, not curing it. He may simply hope to relieve the hemorrhage, the discharge, or influence the pain. The man who cries aloud that radium fails as a cure for cancer, is as a rule the only one who uses that dangerous word "cure." As you would treat the tuberculous case, the nephritic patient, the diabetic, so would we have you treat cancer: give radium where indicated.

We would operate wherever possible, if the advantage is for the patient—at the same time we believe that before long you will never operate for cancer removal without instituting pre-operative and post-operative radiation as an adjunct measure.

When radium is applied to a malignant mass in proper and sufficient dosage, very definite changes in its structure are noticed. The first effects of radiation are seen in the vascular supply. There is a stenosis with constant interference with the nourishment of the mass. Next we observe a distinct influence on the cancer cell and the intercellular substances. Radium causes new chemical formations, hastening the processes of deoxidation: almost immediately cell proliferation is inhibited. Although apparently the parent cell nuclei is not destroyed, it is prevented from splitting up into two daughter cells. The function of the cancer cell is exceedingly short-lived in its cycle from birth to death. If it fails to germinate further cells when properly radiumized, it dies, as it were, without an offspring, and the process multiplied, may bring us a complete destruction of an initial cancer lesion. At the same time near and adjacent lymphatic channels may be successfully blocked against metastatic advance.

Radium therapy will be found of necessity, to be a very special study, which finds greatest success in institutional support. It demands the combined efforts of the skilled diagnostitian, pathologist, biochemist, and physicist as well. At present we find no fault with the individual surgeon who wants to supply his own radium, but shortly he will recognize that best results can only follow co-ordinate laboratory check-up.

The multitude of problems that gather around the question of type of growth, its density, and vascularity, must be considered. Anatomic relationships covering adjacent structures are to be well understood. Then comes an intimate acquaintance with the dosage scale of radium and its penetration through the various tissue, together with a knowledge of the power of certain metals, rubber, paper, etc., to act as desirable screens for improper rays. Filtration of ray energy becomes one of the prime essentials of successful therapy. Again comes what we believe to be the greatest of all subjects for consideration, namely, the regulation and control of the elimination and metabolism of the radium case.

With this brief outline of our personal acceptance of radium therapeutic worth, let us consider just wherein it can be advised as justifiable procedure. Our first classification would naturally be operable and non-operable cancer. It is our opinion that all cases of cancer operated should first receive radium or X-ray radiation ten days to two weeks before excision. Inoperable cases quite frequently under radium treatment are again placed in the operable class—this is particularly true for cancer of the uterus. Broadly speaking, the inoperable cancer must be looked upon as hopeless under any measure of treatment, but with radium we produce palliative effects which change the character of the discharge, destroy odor, check hemorrhage, and, at times, to a marked degree, control pain. A tonic influence noted in most cases serves to restore hope again to the patient, that is indeed comforting to those who must continue to minister to the end. If radium failed to cure a single case of cancer, the comfort it affords the inoperable, makes all effort with radium study worth while.

In 1919, in the United States, cancer is credited with a mortality list of 90,000 cases—as many victims as the States had in her entire Service in the Great War. Detailed, the loss would show 40,000, or about 45% to be due to malignancy of the stomach, liver, and intestines. The next group cover the female generative organs and carry a mortality of 20,000. Then follows the head, covering mainly the buccal cavity with 3,500, and finally the purely superficial types that number some 15,000.

Cancer of the head, may of course be of many types, but mainly we divide them into epithelioma, sarcoma and carcinoma. Although general medical opinion is still unfavourable to radium, there seems to be a liberal acceptance accorded for the large percentages of good results shown in superficial epithelioma of the skin and lip. Under improved technic possible with planted radium needles or emanation seeds, we are reaching excellent percentages of clinical cures in neoplasms of the tongue, tonsils, and pillars of the fauces. Bad results are still common in the posterior third of the tongue. The rapidity with which

primary cancer spreads by metastases from the tongue and tonsil, to the glands of the neck, make it necessary to give thorough radiation to suspected chains of glands early, followed by immediate surgical removal. The efficacy of radium in superficial epithelial tumours of the skin around the eye is not questioned.

Sarcoma occurring about the naso-pharynx and orbit is often controlled by radiation. The more distant from the glands of the neck, the better the results.

Carcinoma involving the throat showed a discouraging mortality in the larger radium hospitals up to two years ago. Although no cures are reported, we have been able to trace 39 cancers of the larynx treated with radium needles that are alive after 18 months. Cancers of the true and false vocal cords are very resistant to destruction, yet we find them to be seemingly slow in developing metastases. This gives us considerable time to attack it in the primary state. We have had several experiences in which the growth has disappeared under the first radiation, and in four or five weeks again show evidence of activity. A second and a third radiation were followed by a similar return. Cancer is probably only curable when found in its initial stage: therefore the appeal of the surgeon for early recognition is equally important to the radium therapist.

Radiation of the female generative organs furnishes probably the most notable reports to commend radium. There is no form of cancer that offers the possibility of a cure as compared with localized carcinoma of the uterine cervix. Starting as it often does in the borders of an old laceration which has degenerated into a chronic cervitis, it should not escape the family practitioner. Seemingly for several months a neoplasm of the cervix is walled off from advance to the fundus and abdominal glands. Under radiation, favourable results in nearly 30% of cancer of the cervix are conservatively accepted. You are all aware that surgery in such cases shows a far more discouraging record. When cancer of the vaginal walls presents, the prognosis is unfavourable. Involvement of the uterine body brings a conflict of judgment. For the most part we favour thorough preoperative radiation of the pelvic glands and prompt operation. Post-operative use of radium may be also offered. We have already touched on the boon offered the hopeless victim of inoperable pelvic cancer with radium, and we wish further to accentuate this because we are frequently astonished at the wonderful recuperation that frequently follows the introduction of radium therapy. In fairness, we want to speak a warning; when we meet a case far advanced toward the end, who is not suffering much pain or is easily controlled by narcotics, we may well hesitate in urging radium. We have, in a few cases, seen violent pains develop after heavy radiation, that were so agonizing as to beggar description. Any acute or inflammatory processes, of infectious origin in the pelvis serve as a contraindication for the use of radium. The acute will be aggravated, and the chronic cases will be lighted up. Poor elimination, and broken metabolic function follow with such types, and can be recognized by the competent diagnostitian.

Radium applications, within the cervix or intra-uterine cavity are easily made, and standardized dosage is now a matter of record. At times we find it possible to secure better results by fortifying such dosage with a cross-fire application of radium placed high in the rectum, cross-firing to a large amount of radium applied suprapubically. X-ray radiation in conjunction with radium may work very well. With due care there are practically no dangers or contraindication governing the use of radium in uterine malignancies. For our own part, we believe better results will come as we grow bold enough to make one terrifically intensive radiation do the work. A deterrent caution confronts us in the danger that is ever present, of creating a burn which could easily result in a vesico vaginal or recto vaginal fistula.

Malignant tumours of the urinary bladder and prostate offer an increasingly fertile field for radium therapy. Cancers of the bladder show a long and persistent train of symptoms, not infrequently covering three or four years. Indeed they may be recurrent tumours following the removal of some so-called benign papilloma. We are inclined to discredit the word benign: unless cured, they become malignant. Metastasis from tumours of the bladder is slow and gives a long period for curative effort. Brilliant operative work is now done on many bladder tumours where infiltration is not extensive but the mortality is high. We are materially improving the records in all genito-urinary clinics where radium is advocated. Where a suprapubic cystostomy is possible, we advocate the implantation of radium needles or emanation seeds, followed by two or three cross-fire radiations from rectum to suprapubic region. Where operation is impos-

sible, and a cure is not hoped for, palliative results, such as relief of pain and bleeding are commonly met. Application of radium tubes through the cystoscope has been made for several years but its effects have not proven satisfactory. Emanation seeds may, however, be injected through the cystoscope directly into the mass. In this paper, we have attempted no dosage report because we felt that such a statement would be too technical for so general an assemblage.

Before closing we must refer to the remarkable and astonishing results that follow the use of radium in lymphosarcoma and in myelogenous leuchemia. It is not an uncommon experience to see a mass in the neck as big as the crown of a derby hat, disappear in two weeks; almost as startling are the transformations noted in the reduction of the spleen, in leukemias, following the first application of radium. In such cases the surgeon willingly stands back hopeless. Although recurrences or general metastases in the lymphosarcoma cases commonly follow, we are encouraged to feel that radium may, with improved technic, become a cure.

Cancer in the early stage is rarely if ever painful; it closely simulates other diseases and diagnosis by the family practitioner is delayed. The physician therefore cannot be blamed unless he also takes the stand of "waiting further to see what happens." Let us multiply our warnings to the laity relative to any abnormal growth, any source of chronic irritation, and make them aware of the simplicity of caring for such conditions before a danger stage developes. We shall not always agree on all things that are best for treatment, but the profession in general must announce authoritative opinions that will serve to guide the public in the cancer problem.

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**Endocrinology.**—The mere fact that hundreds of physicians and thousands of patients have testified to having profited by the use of this or that endocrine preparation, R. G. Hoskins, Columbus, Ohio (Journal A.M.A., November 5, 1921) says, carries no conviction of its actual value to one who reflects that the pharmacopæias are filled with useless medicaments of which the same can be said. Reports of cures are convincing only when accompanied by adequate evidence that suggestion and other accessory therapeutic measures, as well as mere coincidence, have been ruled out as the determining factors. So long as practitioners fail to realize the essential requirements of scientific evidence and to educate their patients along this line, not only pseudo-endocrinology but also a multitude of other pseudo-scientific cults will continue to flourish. The outstanding fact is that endocrine physiology is largely in a state of uncertainty, whereas the facile applied endocrinology with which we are so unfortunately familiar assumes a large body of substantiated fact. Deductive reasoning, which is the mainstay of a considerable class of self-styled practical endocrinologists, can be productive only when the premises are sound. However probable the existence of numerous circulating hormones, proof of their existence is almost completely lacking The existence of hormonic antagonism remains yet to be proved, however fascinating it is to theorize about. A fantastic theory that has had some currency is that the body cells have a capacity to select from a pluriglandular mixture any hormones they happen to need and to discard the rest. All the evidence is to the contrary. Both clinically and experimentally it is sufficiently plain that the law of mass action has not yet been repealed. To deduce from the unfortunate existing situation, however, the conclusion which certain shallow observers seem to have drawn, that the field of endocrinology itself is merely a mirage, is quite as crass a mistake as to accept as substance every flattering prospect the eye discerns. Endocrinology is one of the most difficult fields of biology. The problems presented are fundamental and quite as fascinating as can be found in any field. There is no easy road in endocrinology, either to discovery or to knowledge already gleaned. There are many problems demanding solution, which require, not genius, but merely accuracy and patience, together with recognition of the ordinary criteria of evidence in any field. What is needed is more work, carefully planned and carried out, less shallow theorizing on the part of those dabbling with the problems, and the consistent but discriminating support of the medical profession. —Journal A.M.A., November 5, 1921.

# A STATISTICAL STUDY OF SEVENTY-SEVEN CASES OF TUBERCULOUS MENINGITIS*

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THE following is an endeavour to present, from a statistical point of view, the clinical, laboratory and post mortem findings in a series of seventy-seven cases of tuberculous meningitis.

Owing to the scarcity of internes during the period of the war, the laboratory and post mortem findings during the first two or three years of the period covered by these statistics are not as complete as might be desired.

Of the seventy-seven cases, seven were discharged or removed from the hospital, and the result is not known. Of the seventy cases remaining in the hospital, the termination was fatal without exception. Still (1) reports one hundred and fifty cases with no recoveries, but admits that recovery has taken place beyond doubt.

Martin (2) has investigated twenty-one cases of reported recovery occurring since 1894; in these the tubercle bacilli had been found in the spinal fluid, and inoculation of guinea pigs with the fluid produced tuberculosis. In several cases of reported recovery, investigated at various London hospitals, there were none in which the diagnosis was not questionable.

Kerley (3) has never seen any recoveries.

The average duration of illness for the seventy known cases was 19.9 days. The age did not seem to have any particular bearing on the length of the illness, although it is interesting to note the number of cases occurring with respect to age.

| | | | | | |
|---|---|---|---|---|---|
| 1.3 | per | cent. | of | cases, | one case was under 3 months |
| 15.8 | " | " | " | " | 12 cases were under 6 months. |
| 24.6 | " | " | " | " | 19 cases were under 12 months |
| 20.5 | " | " | " | " | 16 cases were between 1-2 years |
| 37.6 | " | " | " | " | 29 cases were between 2-5 years |
| 13.9 | " | " | " | " | 8 cases were between 5-14 years |

It will be noticed that about forty-five per cent. of the cases were under two years; the incidence being a little greater during the first year than during the second, only about thirty-seven per cent. of the cases occurred during the three-year period from two to five years. After the age of five the incidence falls off very rapidly. This is in agreement with Kerley's statement, that the greatest number of cases occur during the first three years of life.

A series reported by Still gives results in rather close approximation to our own in this respect.

A history of definite contact with another member of the household suffering from tuberculosis was obtained in 27.6 per cent. of the series.

*Symptoms.* The earliest symptoms most commonly complained of were, in the order of frequency: vomiting, dullness or drowsiness, convulsions, headache, irritability, and loss of appetite.

*Physical signs.* The first physical signs most commonly observed in these cases, and in order of frequency, were:—rigidity, disturbed pupillary reactions (strabismus, ptosis, etc.), Kernig's sign, Brudzinski's sign, and paralyses. In infants, bulging of the anterior fontanelle, where this was not closed, was one of the first physical signs to appear. Choroidal tubercles, frequently noted by some observers, were not present in our series. Batten (4) reports choroidal tubercles present in seven per cent. of his series, but makes the statement that they are easily missed in an examination of the fundus.

*Blood.* There was nothing very significant in the blood findings. The average leucocyte count was about 15,000, ranging from 4,100 to 28,000; the polymorphonuclears constituted on an average 65 per cent. These figures correspond fairly closely with those of Morgan (5). The average count in his series was 20,900. The lowest count 5,400 and the highest 70,000. The polymorphonuclears averaged 72.6 per cent.

*Cerebro-spinal fluid.* The cell count ranged from 3 to 1,870; the majority of the counts being between 100 and 400 cells. Positive globulin tests (Noguchi) were present in 92 per cent. of the fluids, on which tests were performed. A film was present in 90 per cent. of fluids examined,

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and tubercle bacilli were found in 68 per cent. of the cases in which a search was made.

Forbes (6) found tubercle bacilli in 27 of 47 cases, or in 57.4 per cent. More recently he found them present in 25 of 31 cases, or in 83.9 per cent.

*Skin tests.* It is interesting to note that tuberculin skin tests were positive in 84 per cent. of cases in which a test was made. During the earlier part of this five-year period, the Von Pirquet skin test alone was used.; during the latter part Von Pirquet and intracutaneous tests were made in each case. In one instance, only, did the tests disagree, the Von Pirquet being negative and the intracutaneous positive.

Kerley (3) reports the Von Pirquet test as being always positive in tuberculous meningitis; Batten (4) states that it is often negative. Our results force us to agree with the latter.

*Complications.* Complications were present in forty per cent. of the series; these included pulmonary and miliary tuberculosis, acute and chronic bronchitis, broncho pneumonia, whooping cough, otitis media, pyelitis. A diphtheria carrier was found.

*Pathological findings.* Fourteen post mortem examinations were made. During the earlier years of the war only a very occasional case was autopsied. Of the last ten cases of the series post mortem examinations were made in one hundred per cent. Permission to examine the brain being obtained in eight of them.

A post mortem examination of the organs revealed the presence of tuberculosis as follows:

| | |
|---|---|
| In the bronchial glands | 92.8 per cent. |
| In the lungs | 78.6 " " |
| In the spleen | 71.4 " " |
| In the liver | 57.1 " " |
| In the suprarenals | 50. " " |
| In the mesenteric glands | 35.7 " " |
| In the intestines | 35.7 " " |
| In the kidneys | 35.7 " " |
| In the bladder | 7.1 " " |

No evidence of tuberculosis was found in the heart or pancreas in any case. Of the eight brains examined, tuberculosis was found in the brain as follows:

| | |
|---|---|
| About the base | 100 per cent. |
| On the cortex | 75. " " |
| In choroidal plexus | 37.5 " " |

Mention of a primary focus is made as follows:

| | |
|---|---|
| In bronchial glands | 75. per cent. |
| In mesenteric glands | 12.5 " " |
| In lungs | 12.5 " " |

I am indebted to Dr. Alan Brown, physician-in-chief, for permission to use these records.

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**Pylorospasm in Adults.**—Finney and Friedenwald (Amer. Jour. Med. Sci., October, 1921) discuss the medical and surgical treatment of pylorospasm in adults. The largest number of cases are secondary to some irritative lesion in the stomach, or as a reflex from disease elsewhere —for instance, chronic appendicitis, gall stones, nephritic colic, etc., but a few are purely neurotic without any definite lesion. Symptomatically hunger pains, relieved by emptying the stomach or by taking food, occur two or three hours after meals with palpable stomach contractions, and signs of intermittent stagnation and hyperacidity. It is important to determine whether the lesion producing the spasm is within the stomach or beyond, or whether the condition is purely nervous, and in this connection x-rays are most valuable in differentiating between the types. Medical measures should always be carefully tried before resorting to other methods of treatment, and the underlying neurasthenia should be overcome by change of scene, massage, and rest. Easily digested food at regular intervals should be given, and the administration of olive oil is of service, the attacks being relieved by morphine and atropine hypodermically, hot applications, and lavage. Atropine in full doses, or adrenaline nucleoprotein, are valuable in relief of spasm, but if this is secondary to other abdominal lesions the primary cause should be removed first. The authors conclude that when medical measures fail pyloroplasty gives the most satisfactory results.

# HEART BLOCK AND AURICULAR FIBRILLATION

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HEART Block and Auricular Fibrillation as separate clinical entities are common enough. The gradual establishment of first one then the second condition and their permanent association together is of sufficient rarity and interest to warrant the report in detail.

*Clinical History.* The patient, a male, aged 62 years first came under observation, December 5th, 1913, being admitted to the Medical Department of the Royal Victoria Hospital for an attack of acute bronchitis. At that time he stated that he had been subject for years to frequently recurring attacks of Winter cough, that lately he had noticed that on exertion he was short of breath and that both legs were swollen. A glazier by trade, he knew nothing of any previous illness. His indulgence in cigarettes was excessive, but moderate in spirits and beer. He denied venereal disease. On examination he presented the appearance of a short, thick-set, grey-haired man, manifestly in distress, cyanosed and dyspnoeic, the dyspnoea being frequently aggravated by prolonged spasms of cough and expectoration. There was distinct cyanosis and clubbing of the finger and toe nails, and a moderate oedema of the legs and ascites. The lungs were markedly emphysematous with hypostatic congestion at both bases, and signs of a general bronchitis. The pulse was regular in rhythm but irregular in volume; there was marked thickening of the peripheral arteries. The heart was enlarged to 15.5cm. in the greatest transverse diameter; the cardiac sounds were distant and at the mitral orifice there was a systolic murmur of insufficiency. There were no signs of pericardial effusion. The liver was tender and enlarged, two finger-breadths below the costal margin. The blood pressure was systolic 140mm. diastolic 100 m.m. The pulse readings were 108 as a maximum but settled down later to a regular rate of 80 per minute. The urinalysis showed a Specific gravity of 1015 and a persistent albuminuria with granulo-hyaline casts. The eye-grounds showed an albuminuric neuro-retinitis. Under treatment he was discharged much improved, December 17th, 1913. In the succeeding months he was able to return to his occupation but increasing weakness and periods of increased dyspnoea on exertion compelled him to rest at home for varying intervals.

He was re-admitted on February 19th, 1915, with the history that six weeks previously he had been seized with a sudden attack of great weakness, dyspnoea and subsequent oedema of his legs and abdomen, and a return of the cough and expectoration. His general condition was very much the same as on the occasion of his last stay in hospital. There was, however, a strikingly slow pulse rate, eighty on the last examination it now registered forty and on several occasions thirty per minute. At times a *well marked venous pulse in the neck recorded double the rate of the radial.* The cardiac signs, both as regards sounds and measurements, were unchanged. An electrocardiogram (Fig. 1) revealed a condition of complete heart-block, February 12th, 1915. Referring to Fig. 1, we find the auricular rhythm is in the main regular, but the inter-auricular periods, where they are interrupted by an intervening ventricular contraction, are shortened. For example, in lead I the interval between the 6th and 7th, auricular complexes measures 0.69 secs. whilst that between the 10th and 11th is 0.74 secs. The ventricular contraction appearing to increase the auricular excitability with a disturbance in rhythm(1). It is evident that here the auricular contraction arises independently of the ventricular, at times altering the shape of the T wave, again coinciding with the QRS complex and at all times bearing no constant relation to the ventricular complex. The ventricular rhythm also varies, e.g. the inter-ventricular time relation between the second and third complexes, lead I is shortened and followed by a ventricular complex which is prolonged 0.18 secs. as com pared with 0.08 secs. of the first complex.

*I am indebted to Dr. W. F. Hamilton, under whose care this patient was, for permission to study his condition.

In lead II likewise there is a disturbance of rhythm and an alteration in the ventricular complexes. While their origin is of supra-ventricular type, the distortion would seem to be caused by disturbance in conduction below the auricular-ventricular node. The third lead also shows similar changes both in time relations and conduction. The last three complexes suggesting a lesion of the left bundle branch, with defective conduction down the same. (2). From all of which we can say that there is already complete auriculo-ventricular dissociation and changes in the excitability and conduction of the conducting system below the a.v. node. Atropine gr. 1-60 hypodermically was given but without any effect on the ventricular rate, ruling out a vagus nerve effect. No change in his general condition or in the electrocardiograms was noted until February 29th, 1915, when the pulse became irregular and increased in rate to 45 per minute. vide Fig. 2. A fluoroscopic screen examination at this time showed a general cardiac enlargement with *the auricles beating at twice the ventricular rate.* In lead I. fig. 2. there is a definite two to one block, the ventricle responding to alternate auricular contractions, with a P-R. interval of 0.18 secs. The auricular rate being 83.3 per minute and the ventricular rate 42.8 per min. The irregularity and increase in rate as noted above are explained in lead II.; the ventricle responding to stimuli from above at irregular intervals and with P-R. intervals prolonged to 0.20. secs. In all the leads the QRS complex is prolonged with measurements of 0.21—0.23 secs. and in leads I and III. are seen the wide and notched QRS complexes such as we have been accustomed to associate with right bundle branch lesions (3); or according to other views, arborization block (4). After a week of rest, no other treatment was given, a third electrocardiogram was taken, (Fig. 3.) before his discharge. In this we see the block has passed off leaving a normal rhythm, a pulse rate of 60 per min. and a conduction time of 0.22 secs. which is greater than the usual limits of normal conduction. The characteristic QRS complexes as seen in Fig. 2. are still present. He was discharged in fair general condition, able in a few weeks to continue at his work without very marked distress.

The next three years are very much a repetition of what had gone before; a period of light work; an interval of rest. He was readmitted to hospital in April 1918, with a 2 to 1 block which persisted with ventricular rates of 36 to 48 a minute. The blood pressure at that time was systolic 265, diastolic 100 mm.

In January 1919, a return of his symptoms of loss of compensation compelled him to seek hospital aid. He presented the typical appearance of loss of compensation; dyspnoeic, moderately cyanosed with ascites and oedema, etc. and general hypostatic congestion of the lungs. The pulse was slow, 48 per minute, but regular. The pressure was systolic 240, distolic 90. The heart was dilated with a transverse enlargement of 22.2 cm. The cardiac sounds were very distant. The aortic second sound was accentuated and followed by a soft diastolic murmur of insufficiency this was the first time this condition was noted, also a capillary pulse in the finger nails. A blood Wasserman test was negative. The electrocardiogram taken on admission presented an entirely different picture. Vide Fig. 4. There is the same left-sided preponderance, the same right bundle branch lesion, but no evidence of a regular co-ordinate auricular contraction. The auricular deflection is replaced by a series of small diphasic waves, marked 'f', which are taken to represent auricular fibrillations. An important point to note is that the ventricular rhythm is regular at a rate of 48 per. minute. Now if the auricles are fibrillating an absolutely irregular rhythm is to be expected. For such a combination as was now present there must be a complete block between the auricles and ventricles with the ventricles initiating their own rhythm, idio-ventricular rhythm.

From this date on the block seems to have become established, as all subsequent tracings present the same general features, vide Fig. 5, taken October 25th, 1920; in this the auricular fibrillation is more distinct. In Figs. 4 and 5. the same fibrillation feature persists. But in leads I and II of both tracings the ventricular deflections are in reverse directions. In Fig. 4, the direction of the ventricular deflections in leads I and III point to a right bundle branch lesion (3). The altered deflections in Fig. 5 seem to indicate a transitory stage between that seen in Fig. 6. where the QRS complex, lead III has again reversed, which feature in association with the corresponding deflection, lead I, would represent a left bundle branch lesion; both bundles of the conducting system being in turn involved. (5)

The clinical history of this patient taken in conjunction with the graphic records, illustrates very

clearly the gradual but surely progressive nature of a myocardial invasion.

The first knowledge we have of him is in 1913 with the complaint of acute bronchitis, which was apparently caused by, and served to mask, a myocardial lesion quite advanced even at that time. In 1915 a complete heart block occurred but was not yet permanently established; in 1918 a persistent 2 to 1 heart block; in 1919 a complete and permanent heart block complicated with an auricular fibrillation. The very decided increase in the cardiac diameter with very pronounced rises in blood pressures are also noteworthy features; in 1913, 140 systolic, 100 diastolic; in 1918, 265 systolic, 100 diastolic; in 1920, 280 systolic, 110 diastolic. Coupled with this the increasingly shorter intervals of freedom from symptoms and the marked restriction of the field of cardiac response, point clearly enough to a progressive condition.

Similarly, but with more detail as to the structures involved, the electrocardiograms show first a complete heart block, under the influence of

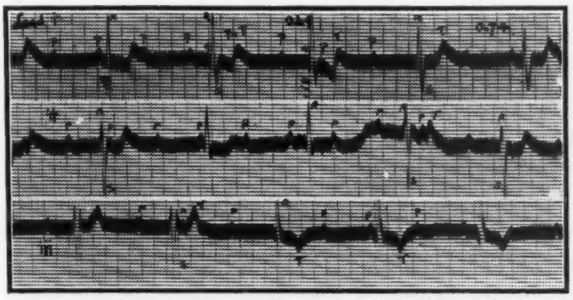

FIG. 1,—February 12th, 1915. Complete heart block; auricular rate 90, ventricular rate 42.8; left sided preponderance. Note changes in QRS complex in both direction and shape.

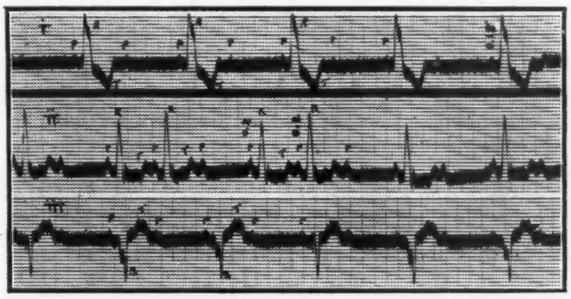

FIG. 2.—February 29th, 1915. Partial heart block; in first and third leads 2-1 block; second lead irregular block. Note characteristic split QRS complexes in first and third leads—right bundle branch lesion.

Conduction time lead i-0.18 secs: lead ii-0.20 secs.

The ordinates represent one-tenth millivolt each, the abscissae 0.2 secs.

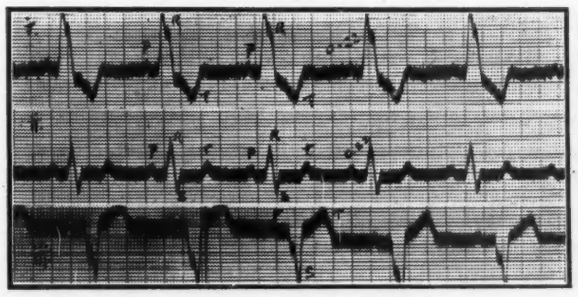

FIG. 3.—March 8th, 1915. Normal S-A rhythm, block having passed off. Prolonged P-R conduction time 0.22 secs. Characteristic ventricular complexes of right bundle branch lesion.

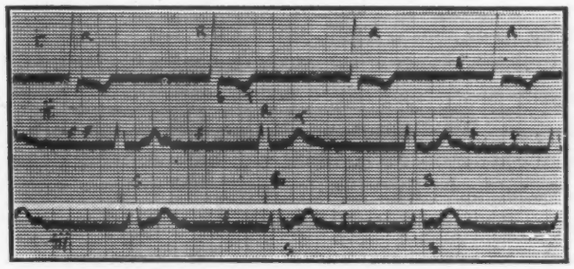

FIG. 4.—January 8th, 1919. Absence of auricular complex. Auricular fibrillation with a regular ventricular rate—complete auriculo-ventricular dissociation.

Ordinates represent one-tenth millivolt; abscissae 0.2 secs.

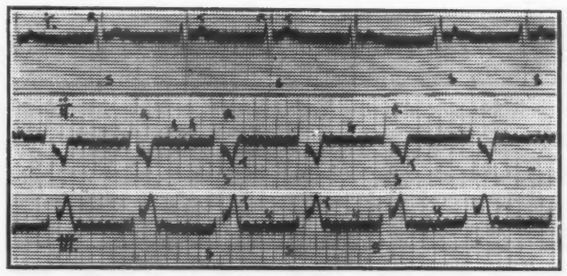

FIG. 5.—October 25th, 1920. Auricular fibrillation with heart block; fibrillation waves marked 'f'; note the change in the direction of ventricular complex leads, 1 and 11. as compared with FIG. 4. due to conduction changes in the bundle of H i s.

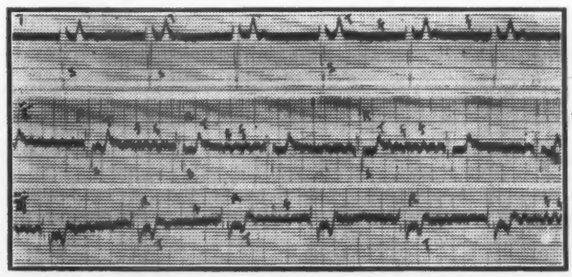

FIG. 6.—January 17th, 1921. Auricular fibrillation and heart block. The QRS complex, lead iii. has changed to an upright deviation suggesting left bundle branch lesion.

Ordinates represent one-tenth millivolt, abscissae 0.2 secs.

Similarly, but with more detail as to the structures involved, the electrocardiograms show first a complete heart block, under the influence of

rest, passing to a normal rhythm but with a damaged conduction system. The next stage shows a permanent 2 to 1 block which eventually passes over into complete auriculo-ventricular dissociation; and finally the added complication of auricular fibrillation.

Now although complete block is quite common, it is rather remarkable that the auricles being completely cut off from the ventricles should not more frequently go into fibrillation, considering the very widespread myo-cardial damage that appears to be present. However, this unusual combination has occurred here as borne out by all the evidence. When we come to consider the actual anatomical lesion, the similarity of clinical signs to a case reported by A. E. Cohn and T. Lewis (5) is so striking, that until the opportunity presents itself for a minute examination, we are inclined to assume similar lesions in this patient. In the former case there was a distinct syphilitic infection, in our case such is not present. In the postmortem findings reported by these two physicians, there was, in addition to an extensive interstitial fibrosis of the cardiac muscle, destruction of part of the sino-auricular node by fibrous tissue invasion; destruction of the muscular connection, auricle to A.V. node; a severance of the main stem of the bundle of His below the A.V. node; and a destruction by invading connective tissue of both the right and left branches of the bundle where they join the main stem. When last seen in July, 1921, this patient was fairly comfortable and in a fair state of compensation, able to walk about the house but no more. The blood pressure at that time was systolic 280, diastolic 110. The state of fibrillation and heart block still persisted.


### Summary

1.—The gradual progressive stages of a case of chronic myocarditis on to first a partial heart block then a complete auriculo-ventricular dissociation are presented.

2.—As the lesion progresses, in addition to the permanent heart block a state of auricular fibrillation is added.

3.—The probable anatomical lesions are discussed.


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**Decapsulation in Renal Disease.**—Rovsing (Hospitalstidende, August 24, 1921) has performed decapsulation of one or both kidneys in 77 cases of renal disease, and is satisfied that in a large proportion of cases this operation can restore to complete health patients who would otherwise be doomed to early death or chronic invalidism. His opinion of the operation is so favourable that he recommends it in every case of nephrosis which does not react satisfactorily to medical treatment. In itself the operation is not dangerous, and it is technically easy to perform. When he finds the capsule of the kidney fairly normal, the author simply strips it off the kidney up to the hilus. But when he finds the capsule very fibrous and thickened he excises it. He reminds the physician that chronic nephritis is comparatively often unilateral, and that it is therefore always advisable to catheterize the ureters when cases of nephritis are investigated. He has found that in most cases of interstitial nephritis characterized by attacks of hæmaturia and pain complete cure can be effected by decapsulation. Indeed, all his 26 cases of interstitial nephritis and perinephritis, associated with attacks of pain and hæmaturia, but without albuminuria in the intervals between these attacks, were cured by decapsulation. His least satisfactory results were obtained among cases of small granular kidney in an advanced stage. But even in these cases headache, nervousness, lassitude, and inability to work often passed off completely, and the albuminuria disappeared or was markedly reduced. The good results achieved in cases of orthostatic albuminuria were probably due to fixation of the kidney in its normal position by the operation; the same result can, however, be obtained by the support to the kidney effected by well-fitting bandages.

# SEPTIC ABORTION*

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AN abortion is the interruption of pregnancy before the child is viable. The term premature labour should be used to designate those instances where pregnancy terminates before maturity but after the child has a chance to live. In scientific description it is better to discontinue the use of the term "miscarriage," which is used by the laity to apply to the interruption of pregnancy at any period before full term.

A septic abortion will have the same suggestive clinical manifestations as an a-septic one, with the addition of the findings associated with an infective process. At times this infective process may arrest or modify the symptoms which we consider to be the characteristic phenomena of abortion. Then, again, evidence of contamination may appear at any stage of the abortion process and even after its completion, depending upon the time infecting organisms entered the body and also upon the dormant period of these organisms.

*Causation.* Abortion is brought about by causes associated with either the fœtus or the mother. Disease or malformation of the fœtus or its appendages may result in its expulsion. In the mother, syphilis or other infectious disease, toxæmia of pregnancy or toxæmia from anæsthesia, alcohol and drugs; mental disturbance, abortifacients, local pelvic disease, particularly chronic endometritis and malpositions of the uterus, are all possible and frequent causes of abortion. The greatest etiological factor is, however, criminal interference either by the pregnant woman herself or by the abortionist. Of fifty-one women attended by me during abortion, twenty-two admitted criminal interference. This percentage of forty-three would have been materially increased if all the patients had been equally frank.

The process may be rendered septic in two ways, speaking very broadly: the infection may have its origin within the body of the patient, or on the other hand it may be introduced from without. Polak (1) regards the uterus during involution as a wound. Certain it is that when the placenta or decidua separate from the uterus a wound is the result. This wound is bathed in blood and forms at once a splendid culture medium as well as an avenue of entrance for any bacteria which may reach this situation. It is possible that the organisms may be carried in the blood from a focus of infection remote from the pelvis. The teeth sockets, the tonsils, the accessory nasal sinuses, the gall bladder, may harbour bacteria which often escape into the blood stream. It is possible that the puerperal wounds may thus be infected endogenously. Every writer on this subject suggests this method of infection, but satisfactory clinical and laboratory proof is lacking. The role played by focal infection in the production of toxæmias of pregnancy has long been suspected. Recently Talbot (2) from a clinical study of the placenta finds evidence of blood-borne infection in that organ. Rosenow (3) in his study of the elective localization of bacteria in certain lesions found that when a pregnant rabbit was used in the experiments the lesions were produced in the fœtus of the same character as those in the parent rabbit. Infectious infarcts in the placenta and infections produced in the fœtus go a long way toward establishing the possibility of the infection of puerperal wounds by blood-borne organisms. Further work along the lines indicated by Rosenow (3) ,(4) will doubtless solve this problem. There is, however, a method of autoinfection about which it is not necessary to speculate. Latent or active infective processes may be located within or in close proximity to the genital tract. The vagina under ordinary circumstances contains a varied bacterial flora which although apparently innocent there, if carried to the fresh wounds above may set up a serious infection. Many suffer from leucorrhœa from chronic infection of the cervical or vaginal mucosa, or of the deeper glandular elements of the cervix or vulva. The presence of the gonococcus in the vagina is a more serious circumstance. All are familiar with the tragic sequence of events which frequently follow abortion or labour in those who suffer from gonorrhœa. If

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the patient's life is spared, years of suffering are probably ahead of her, with sterility and mutilating operations in addition. Certain authors stress the importance of the male fluid in the vagina as an important factor in the causation of infection. Bathing has also been held responsible for the entrance of germs into the birth canal to infect puerperal wounds.

Autoinfection is, doubtless, assisted by the general condition of the patient, she being often particularly susceptible to infection from the severe anæmia and shock of the abortion or from some concurrent condition.

The introduction of infected material from without is, however, the cause in the great majority of cases. DeLee (5) considers it to be proper in all cases of septic abortion to suppose that the abortionist has been at work. Most authorities agree that a very large proportion of these cases are due to the work of the abortionist or to the patient herself. In the author's series of thirty-one cases which forms the basis of this study, fifteen of the patients admitted criminal interference. The abortionist does not make adequate preparation of the parts, the hands, or the contrivances. The work must, perforce, be done secretly, which presages the fact that the operation is undertaken without assistants or proper preparation. The abortionist must have no witnesses to his deed. Holmes of Chicago holds that all criminal abortions should be treated as septic until the clinical course proves otherwise. The abortionist is realizing the importance of asepsis as is evidenced by the fact that of twenty-two cases of admitted criminal abortion in my series, seven did not become septic.

Regrettable as it may seem, the physician or nurse may be the party responsible for the infection. Unclean hands, faultily prepared dressings, packing and instruments, or carelessness in the toilet of the patient may be the causative factor. In this connection the proximity of the orifice of the bowel must ever be regarded as a potential danger, and all means taken to prevent material from the bowel entering the genital tract. This is perhaps more important in labour at maturity, where the advance of the presenting part expresses from the bowel material which may reach the inevitable wounds caused by the trauma of birth. Bonney (6) gives it as his opinion that too little attention is given in all obstetrical procedures to the isolation of the anal region from the field of operation, and perhaps too much stress given to the possibility of infection from without. An improper technique may be responsible for the transplanting of bacteria from the vagina or vulva to a higher position in the genital tract, where they have an opportunity to invade. In infected cases one should bear in mind that the patient may be infected by one organism in pure culture, and that in order to prevent a mixed infection the preparation and technique must be just as thorough.

*Symptoms.* Added to the phenomena of abortion will be noted a rise of temperature often preceded by a quickening of the pulse. If all cases of abortion are put on a two-hour pulse and temperature chart one is frequently able to discover that all is not well with the patient long before she has symptoms. Throughout the disease the pulse is a more reliable guide to prognosis and treatment than the temperature. A rising pulse rate unless associated with a corresponding rise in temperature is an ominous sign. The temperature may rise to 105 or 107 and fall as suddenly. In other cases it may show a steady daily rise; and in still others it may never go above 101, even although some of such cases may terminate fatally. The temperature does not indicate whether the infecting organism is a benign saprophyte or a virulent streptococcus. One's equanimity need not be much disturbed if the pulse rate remains low, even when the temperature is very erratic. Chills and chilliness are usual. Repetition of chills indicates fresh invasions. Pain is usually not complained of until the peritoneum is reached except in cases of acute congestion of the pelvic organs. An increase in the white blood count is usual, and Polak (7) uses this symptom as his indication for surgical interference. In the writer's series it was noted that in four patients severely ill there was a leucopenia. One of these died.

*Lochia.* Over and over again it has been stated that because there was no odour to the lochlia that there was no infection of the genital tract. As a matter of fact, in streptococcic infections it is extremely characteristic for the normal musty odour to disappear. In sapremic infection the lochia is usually very offensive and profuse. A scanty discharge without odour leads one to suspect that he is dealing with a systemic invasion by the streptococcus or other organism.

*Diagnosis.* The fact of a septic abortion is determined by exclusion as in the diagnosis of any other pathological condition. Any one of all the conditions manifested by a thermal course may either be the cause of the abortion or con-

current with it. It is the height of folly to attempt any radical treatment until it is definitely and positively determined that the illness is due to infection within the pelvis. Holmes of Chicago states that while on the abortion committee of the Chicago Medical Society he had opportunity to observe many instances where cases came to autopsy with a diagnosis of death from puerpural sepsis and in which the pathologist discovered no evidence of pelvic disease but did find such conditions as pneumonia, brain abscess, and acute abdominal conditions. One should be loath to discourage thoroughness in diagnosis, but little if any good so far has resulted from the identity of the infecting organism. If the blood culture shows a growth the prognosis is more serious, but whatever germ is found the treatment remains the same, most authorities being frankly pessimistic in regard to vaccine or serum therapy in this condition. One cannot help feeling that in this direction lies truth; but let us leave it to the trained path-finders to show us the way, and let us not follow the many "will o' the wisps" which in such distracting profusion would lure us from the thoroughfares of sound therapeutics. An admission of gonorrhœa or the possibility of infection by the gonococcus is however an indication for bacteriologic examination of the discharges, as the presence of this organism is a mandate to leave the woman severely alone as far as local treatment is concerned.

*Prognosis.* Nature attempts and usually succeeds in limiting the process by means of an enveloping reaction zone. This may vary from a superficial infiltration of the endometrium with white blood cells to a very extensive inflammatory process deep in the tissues. When the infecting organism is virulent there is apparently no time for nature to complete her protecting wall. In such cases at post mortem there is often astonishingly little evidence of tissue reaction, and the necrotic layer lining the uterus where the infection entered may be entirely absent. This white lining of the uterus is found in most cases of septic abortion and indicates nature's effort to repel the invader at the threshold. Prognosis will be influenced by the virulence of the infecting organism and by the dosage, the immunity, and general health of the patient, and upon the treatment she receives. It also seems logical to suppose that a woman whose pelvic organs were healthy previously will do better than one who has chronic disease there. That treatment avails much is doubted; but let us at least refrain from increasing the helpless woman's difficulties by ill-advised interference.

## Treatment.

*Prophylaxis.* The best treatment of any condition is its prevention. Abortion can be prevented in most cases. To the public health worker we freely offer our tribute of praise for his magnificient accomplishments along many lines. The reduction of infant mortality, the control of venereal disease, the improved living conditions in the homes of the people, and the reduction of the death rate from infectious diseases are results due to the tireless efforts of the physicians charged with the administration of public health affairs. The prevention of abortion is a phase of their work which has as yet received very little serious attention, and any activities undertaken have not been pushed with vigor. The birth rate would be very materially increased if the slaughter of unborn children could be prevented. Many women are losing their lives and many others becoming economic burdens through chronic invalidism following abortion. DeLee (8) says that prognosis as to health is worse after abortion than after labour at term. To give a personal experience, I have attended during a certain period three hundred and fourteen women in labour at term, while during the same period I was called to fifty-one cases of abortion. Thus over fourteen per cent. of my cases aborted. This experience will no doubt approximate that of others, and will give an idea of the serious loss of life from this cause. A great deal can be done to prevent the condition and the following suggestions are put forward for consideration.

The influence of wide publicity has long been recognized as an effectual method of bringing about reform. One need only refer to the campaign against venereal diseases which has made everyone acquainted with these conditions, and by public co-operation has enabled the health authorities to get them under control. A similar campaign in which cold facts about this condition are given the widest publicity, the statistics quoted, the causes of abortion enumerated, and expectant mothers counselled to put themselves under medical supervision at once, would most surely result in a marked reduction in the number of cases. The mere publication of the Criminal Code of Canada as it pertains to abortion could not help but have a deterrent effect on those guilty of improper practices. Its penalties are generous. Life imprisonment is prescribed for

one who administers drugs or uses means to produce an abortion. If the woman herself is guilty the penalty is seven years' imprisonment. The most significant section reads as follows: "Everyone is guilty of an indictable offence and liable to imprisonment for life who causes the death of any *child* which has not become a human being in such a manner that he would have been guilty of murder if such a child had been born." The moral conscience of the public, including that of some physicians, needs educating, and it should be some one's business to make it known that from conception the unborn child is a human creature whose destruction is the equivalent of murder. If the public were in possession of all the facts they would join in hunting down criminal abortionists as they do in the case of other malefactors. At present they flourish and enjoy a certain immunity owing to the apathy of the public toward their crime.

The medical profession has also a duty in this connection. Evidence against the criminal abortionist is often obtained, and while the violation of the confidence of patients is not to be considered it is possible by discreet communications to the local officers of justice to rid the community of the obnoxious person.

The medical man himself should shun the very appearance of evil. Sympathy with the unfortunate woman who for any reason finds the circumstances of pregnancy a hardship should never cause him to suggest that it were better that her pregnancy be terminated. She would probably seize upon this suggestion and use it to salve her conscience in further search for help. A firm, tactful refusal from her family physician will in most cases put the idea out of her head.

To make it more difficult for a woman to operate on herself it should be enacted that druggists are not to sell without a physician's order such articles as male catheters and sponge tents. Ergot, cotton root, and other emmenagogue compounds should similarly be withdrawn from sale except when prescribed. Slippery elm which was used in two of my cases would make just as good tea if the druggists were required to cut it up into small pieces before offering it for sale.

The registration of the birth of a "child" at any stage of pregnancy would have beneficial effect. It would insure that proper statistics were obtained and the seriousness of the loss of life from this cause would be known. It would also be a decided check on the criminal cases.

The prenatal care received by most pregnant women is practically valueless. Many do not see the doctor until he comes to attend them in labour. Others go to "engage" him and see him no more until labour. The doctor may ask for samples of the urine, and he may not. A maternity engagement should be considered a serious matter. The patient's history should be carefully taken and a complete physical examination made on her first visit. The blood should be examined in every case. The urine should be examined and the blood pressure taken every two weeks throughout her pregnancy. The woman should be instructed in the care of her body during her pregnancy and should be taught to recognize the abnormal indications and to seek help when they appear. All this will take time and to the busy practitioner it may not seem very necessary. The satisfaction of preventing one abortion or of saving one woman from eclampsia will amply repay one for much routine work. An engine driver who refused to watch for his signals would not be considered a safe man to pilot the engine, and an obstetrician who does not watch his patient carefully for the onset of difficulty is likewise unfit for his work. Then again, the public are slowly becoming educated to the importance of prenatal care, and the practitioner who fails to satisfy in this regard will be passed by in favour of his more conscientious brother. Of course it is understood that this prenatal care must be properly recompensed, and for those who cannot pay for the service, prenatal clinics should be established in every centre where this care can be obtained without cost.

*Treatment.* The treatment of septic abortion may be: (1) Radical—operative; (2) Conservative—expectant. In increasing numbers the leading authorities in obstetrics are becoming exponents of the latter method. He who would curette, douche, or practice any of the methods of intra-uterine therapy as a routine will lose more patients than he who treats his patients purely expectantly. Williams (9) one of the earliest advocates of conservative treatment, had a mortality of 4.35 per cent. in 1899, while his contemporaries were treating their patients actively with a mortality as high as 30 per cent. Hillis (10) reports an interesting study at Cook County Hospital, Chicago. In order to test the efficacy of the two methods of treatment and to reach a definite conclusion, a clinical test was made. Women brought to the hospital suffering from septic abortion and with a temperature of over 100 were assigned alternately to active and to

conservative treatment. Those on the active list were immediately curetted. The figures were as follows:

| | Active | Expectant |
|---|---|---|
| No. of cases | 100. | 100. |
| Days of fever | 810. | 350. |
| Average days of fever | 8.1 | 3.5 |
| Total days in hospital | 1328. | 848. |
| Average days in hospital | 13.28 | 8.48 |
| Complications | 19. | 4. |
| Deaths | 3. | 1. |
| Percentage mortality | 3. | 1. |

In my series of thirty-one cases of septic abortion, one only was treated actively and this patient died. In her case criminal interference was admitted, and after a long period of expectant treatment the uterus was curetted owing to the continuance of a fairly brisk hæmorrhage. Her temperature before operation did not rise above 100 but did not continue normal. She also vomited occasionally. The curette should not have been used. Packing would have emptied the uterus without as much danger. Thirty-six hours after operation she had a severe chill with an acute rise of temperature. She died in four days with acute bacteremia. The thirty cases treated expectantly recovered promptly with the exception of one who developed a double salpingitis and in whose case a history of gonorrhœa was obtained.

Operative treatment by curettage, digital removal, tamponade, and douches is in each case open to the same objection. It is ineffectual more often than not failing to remove the products of conception, and is in itself a source of danger. The curette is especially harmful and it is doubtful if a thorough curettage of the uterine cavity was ever done. Its configuration is such that it is impossible for the scraping edge to cover more than half the surface. It is true that gross particles may be removed, but it is never possible to be sure that the uterus is empty.

Many authors report cases in which pregnancy has gone to term after what was thought to be a thorough curettage of the uterus. A few weeks ago I was associated with a skilful obstetrician in a case of pernicious vomiting of pregnancy. Interruption of pregnancy was the decision of counsel. My colleague dilated and packed with gauze. The patient did not abort. She was again anæsthetized and curetted. It was thought that the products of conception were removed completely. Some days later she passed a large decidual mass. Besides being an ineffectual instrument it is a dangerous one. Perforations are frequent with its use. The soft friable uterine wall may give way under the gentlest movements of the curette. The most formidable objection to its use in cases of septic abortion is that even with the dullest instrument and the softest strokes new wounds are made and the spread of the infective process is likely to result. DeLee says "My experience has taught me that the traumatism of curettage, digital or instrumental, may be fatal—a superficial and not dangerous infection being converted into one with strong invasive qualities." If the symptoms are due to infected uterine contents, nature can usually be relied upon to empty the uterus in due course. Their retention in the uterus can do no harm. The organisms in the mass may be leading what is practically a saprophitic existence. To employ an instrument to remove them may give these organisms an opportunity to actively invade. Fothergill (11) speaks of using the curette before the pathogenic organisms have entered the blood stream. If the infection is due to a virulent organism it is far beyond the reach of the curette by the time symptoms appear.

The following is the treatment suggested: The patient is put to bed in the Fowler position, seated upon a sling pillow. She is better in a hospital, where she can receive skilled care and be shielded from visitors and annoyances. She should be put on a two-hour pulse-temperature chart. Water and nourishing fluid diet should be given in abundance. The bowels are opened by enemata and gentle laxatives. An ice bag is placed over the lower abdomen. If fluid is not taken freely by mouth glucose or saline solution is given per rectum; or if not tolerated there, by subcutaneous injection. Appropriate stimulation is given if required. Ergot or pituitin are used to keep the uterus in contraction. This probably blocks lymphatic channels. Quinine is often useful to remove retained products of conception. After the temperature has been normal for five full days and the uterus is not empty, the contents should be removed. The patient's return to health is thus expedited.

Should hæmorrhage have to be reckoned with during the course of septic abortion, the following procedure is recommended: With the patient prepared for operation, with plenty of assistants and if possible without anæsthetic, pass the largest sized tubular cervical speculum that can be got in and through it pack weak iodoform gauze with

blunt dressing forceps. Then about the cervix pack sterile cotton layer upon layer until the vagina is full. In twenty-four hours the packing is removed and with it is usually found the products of conception.


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# OBSERVATIONS ON THE VALUE OF LUMBAR PUNCTURE


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LUMBAR puncture has long been recognized as a measure not only of great diagnostic value, but also of considerable therapeutic benefit. The information derived from the examination of the spinal fluid, and the relief experienced on its removal, is, we believe, greatest in the acute inflammatory conditions, such as septic meningitis and epidemic cerebro-spinal meningitis. To these we may add also the tuberculous meningitis. Our present laboratory methods enable us in these acute conditions to make a diagnosis so easily that it would seem little could be added from the laboratory standpoint.

The varied characteristics, however, of the spinal fluid in certain more or less obscure cerebro-spinal conditions and their relation to the blood findings in the same patients, seem to be sufficient excuse for the presentation of a few figures, gathered from the study of 130 examinations of the spinal fluid made in connection with the work of the medical departments of the Montreal General Hospital and the Western Hospital during the past four and a half years.

Laboratory methods for estimating increase in the number of white cells, or increase in the amount of globulin, have become very accurate, and have enabled us to detect the slightest evidence of acute or chronic inflammatory reaction. Add to these tests the serological reactions, and we have further enhanced our methods of diagnosis. In spite of all our tests, however, the clinician may at times find great difficulty in arriving at a definite conclusion in cases showing symptoms of lesions of the central nervous system or cord, in fact at times he may not only be helped *little*, but may actually be *misled* by the laboratory findings.

This study has been confined to conditions, for the most part, purely medical, or cases met with in the medical wards and outdoor clinics. It consists of observations on the spinal fluid findings in cerebral hæmorrhage, cerebral thrombosis, cerebral lues, encephalitis lithargica, poliomyelitis, brain tumour, brain abscess, tabes dorsalis, myelitis and so-called meningismus. The findings have been of interest not only from a medical and a scientific point of view but also from a medico-legal aspect. Several cases have come under observation in which a definite diagnosis was necessary, in that men have taken actions in law courts to recover damages for disabilities which they attributed to accident. Others have arisen in which the obligation to pay insurance was questioned by the company.

Here may be cited two illustrative cases:

R. S., male, age 38, employed as a laborer, fe

from a scaffold while at work. He sustained what appeared to be severe injuries and instituted action for damages. The doctor representing the company having insisted on a lumbar puncture, obtained a spinal fluid showing an increased cell count, a positive globulin reaction, and a positive Wassermann (a blood Wassermann in this case was also strongly positive). It seemed evident then that this man's disability was due to cerebro-spinal lues, and not to his accident, a point impossible to settle without a lumbar puncture.

S. C., age 60, was noticed to have walked home from work on three or four successive evenings with a slightly staggering gait. On the last evening, on reaching his home, he fell down five or six steps, striking his head on the pavement. He was taken to the hospital, where a diagnosis of fractured skull was made. He was operated upon, the skull trephined, a bleeding middle meningeal artery secured, and large clot removed. In spite of an apparently successful operation, however, the patient slowly sank and died. On application to an insurance company in which the man held a policy, payment was refused on the grounds that death was due to a fractured skull as the result of intemperance. The surgeon who performed the operation considered that under ordinary circumstances the man should have recovered, and asked for an autopsy. Post mortem examination revealed a fracture of the left anterior fossa, while on the other side of the cerebrum there was a hæmangioma involving the right tempero-sphenoidal lobe, and the inferior surface of the right frontal lobe. The latter was evidently the cause of his staggering. Lumbar puncture in this case gave bloody fluid. It would, however, in all probability have given bloody fluid had there been *no* fracture. The findings in the spinal fluid in such cases may be misleading.

These are examples of what may be considered the exceptional. However, in the majority of cases fairly definite conclusions can be drawn from the findings in the cerebro-spinal fluid, as will be seen from the following figures:

| Disease | No. of Cases | Blood Wasserman Percent Positive | Spinal Fluid Wasserman Percent Positive | Percent of Cases showing increased white cell count | Percentage of cases showing an increased Globular Reaction |
|---|---|---|---|---|---|
| Cerebral hæmorrhage | 4 | 4 | 6 | 6 | 6 |
| | 32 | 0 | 0 | 81 | 8 |
| Cerebral thrombosis | 19 | 4 | 19 | 44 | 44 |
| Cerebral lues | 29 | 81 | 65 | 90 | 64 |
| Encephalitis Lethargica | 15 | 25 | 0 | 93 | 64 |
| Poliomyelitis | 10 | | | 90 | 100 |
| Tabes dorsalis | 12 | 50 | 57 | 70 | 80 |
| Cerebral tumour. | 5 | 0 | 0 | 100 | 100 |
| Cerebral abscess. | 2 | 0 | 0 | 100 | 100 |
| Myelitis | 2 | 50 | 50 | 100 | 100 |

It will be noted then that lumbar puncture in these conditions may give a great deal of information regarding diagnosis and treatment, as well as marked relief to the patient, by relieving intra-cranial pressure. This relief of pressure is especially beneficial in sleeping sickness, abscess and tumour cases. The operation, however, should not be done promiscuously. The unpleasantness to the patient, the risk of infection (which however is slight), and the degrees of harm arising from suddenly decreasing intra-cranial pressure, should make it a measure to be regarded as demanding caution. For the purpose of diagnosis no more fluid should be withdrawn than is absolutely necessary. A complete examination consisting of cell count, globulin tests and Wassermann reaction may be made from an amount not exceeding four to five c.c. of fluid. The removal of this volume will not materially change the intra-cranial pressure. In our series of cases it was noted that only fifty per cent. of those suffering from cerebral hæmorrhage showed blood-stained fluid at first, a point in favour of drawing off only a limited amount of fluid. We notice again that in the cerebral lues cases only sixty-five per cent. gave a positive cerebro-spinal fluid Wassermann, a figure considerably less than has been found by some investigators. Another point noted is the similarity between the findings in the spinal fluid in poliomyelitis and encephalitis lethargica. During the epidemic of poliomyelitis in 1916, we found cases of the so-called encephali type in which there was marked cerebral congestion and even bleeding into the sub-dural space. In studying encephalitis lethargica we also find cases in which there is an acute, extensive cerebral congestion, with blood in the spinal fluid. Considering these similarities in the spinal fluid and the fact that the pathological lesion in each is indicated by a peri-vascular round-celled infiltration, we may in time find a definite relationship between these two, clinically different, diseases. At all events, the examination of the spinal fluid in these two conditions must be considered only as an *aid* in the differential diagnosis.

In a few instances, a clear but slightly red-tinged fluid was obtained, having an increase of

white cells and globulin, but a negative Wassermann; microscopically no red cells were found, but a positive reaction for occult blood was obtained. This peculiar fluid was noted in cases of tubercular meningitis and of hæmangioma. In such it was only with the finding of the bacilli in the fluid that the early distinction could be definitely made. Two or three cases have also arisen lately in which from the early clinical symptoms it was difficult to distinguish between encephalitis lethargica and acute tubercular meningitis. Lumbar puncture in each case gave a fluid the cell count and globulin of which might have been obtained from either infection. A puzzling condition marked by meningeal symptoms may at times arise in acute infectious diseases, such as scarlet fever and mumps. In these cases lumbar puncture may show a fluid under pressure in which both cells and globulin are increased. In one instance these findings were not only present, but a pneumococcus was found both in smears and cultures. The fluid, however, in this case gradually became normal as the patient recovered. Such findings would seem to be due to the general systemic infection rather than to a true meningitis, as the first spinal fluid drawn would indicate. Other cases might be cited in which the laboratory reports after lumbar puncture would have been misleading without careful consideration of them in the light of the clinical symptoms.

In conclusion it may be affirmed that lumbar puncture carefully and aseptically performed may be regarded as a safe operation affording us much information, and in a measure that should always be made use of in cases showing symptoms indicative of involvement of the central nervous system. At the same time, it is to be remembered that the results obtained by the laboratory examination of the fluid must in all cases be considered only as an aid in our diagnosis.

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**Cancer Phobia.**—An inevitable accompaniment of directing special attention to any disease is to arouse in a certain number of persons phobias almost as terrifying as the diseases feared. To warn the public that "moles, excrescences, fistulas and warts" "are the first signs of cancer" is to erect a spectre capable of shattering even a normal mentality. To say that "symptoms of indigestion" are "signs of cancer" is so small a part of the whole truth that it is better left unsaid. Carcinoma is in the beginning a local disease. It is definitely known that irritation of tissues favour its production. There has also been accumulated evidence as to the earliest signs by which malignant growths manifest themselves. It is well to give the public such facts as these, to advise early consultation with the family physician, and to point out that we have thus far but one sure method of treatment, and that is complete removal of the dangerous growth. The condition itself is sufficiently serious and needs no elaboration as to its terrifying aspects. Give the public all the facts—but facts only.—*Jour. A.M.A.*, October 29, 1921.

**Wiring and Electrolysis for Aortic Aneurysm.**—Sailer (Therap. Gazette, October 15, 1921) from an experience of sixteen cases, considers that the treatment of aortic aneurysm by wiring and electrolysis deserves more consideration than is usually given to it, and records a case, aged 44, treated three years ago, in which immediate improvement followed and progressed. Although generally considered as only likely to live a few days, he is now engaged in arduous and important business. The needle was inserted easily without local anæsthesia, the passage of the wire taking about fifteen minutes. About 50 milliamperes were passed, and after slight temporary spasm, there was immediate relief from pain, and the patient slept horizontally without opiate and with less dyspnœa than formerly. Antisyphilitic treatment followed, and in a fortnight he returned home and has had no setback, improvement steadily progressing, and the dyspnœa disappearing. Experience suggests that the operation is harmless, objective symptoms are relieved immediately, and that antisyphilitic treatment increases the improvement and favours the prognosis.

# ANÆSTHESIA FOR NOSE, THROAT AND ABDOMINAL SURGERY BY THE NITROUS OXIDE-OXYGEN C. E. COMBINATION*

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LET me begin by thanking you most heartily for the great honour you have conferred on me by making me your Honorary Chairman to-day. An honour that I realise quite well is conferred on the Royal Society of Medicine of London, England, through me, their representative.

On behalf of my colleagues, the members of the Anæsthetic Section of the Royal Society of Medicine, I give you greeting. Be well assured that the other members of our Section, although unable to be with us in the flesh, are nevertheless with us in spirit; and are anxiously waiting for the time when they can read the interesting and illuminating papers with which this conference is pregnant.

The study of anæsthetics has undergone so great a change since I began to give anæsthetics some twenty years ago, that it would be a brave man who would foretell the "anæsthetic position" of 1941.

I am neither prophet nor seer, but I venture to think that we are but now entering on an era of anæsthesia fraught with endless possibilities, an era such as our predecessors never dreamed of, indeed I believe that had our predecessors practised the art as we know it to-day, they would probably have been burned at the stake as wizards or magicians.

The anæsthetist of to-day is a totally different individual from the anæsthetist of twenty years ago. Now he has to be thoroughly *au fait* with the thousand and one things that go to the making of a good anæsthetist; he must be thoroughly conversant with all the modern methods, and in short be of real use to the surgeon.

Gone, gone for ever, I trust, are the times when any Tom, Dick or Harry was allowed to give the anæsthetic, quite irrespective of whether he knew anything about it or not.

The time has come when some of the thinking surgeons have begun to realise the importance of a good anæsthetist and a good anæsthetic; and let us hope that the general public will soon begin to realise the importance of insisting on having a skilled anæsthetist whenever possible. I feel sure that I am but voicing your own sentiments when I say that we ought all of us to do our best to put the study of anæsthetics on to a proper basis. Every student of medicine should be compelled to learn this important branch of the profession, and the administration of anæsthetics should be confined to qualified practitioners of medicine. Thus and thus alone can we put anæsthesia on to its proper footing.

The great advances that have been made in recent years lead me to think that we are only now entering on a new era in anæsthesia. At the recent researches at St. Bartholomew's Hospital by Dr. Mackenzie Wallis, on the chemical, and by Dr. Hewer on the anæsthetic side, lead me to think that we have a prospect for the future that almost baffles our imagination.

Wallis and Hewer have produced an anæsthetic under the name of "ethanesal," which is a vast improvement on anything we have had before. Wallis has found that an absolutely pure ether will not produce anæsthesia, he has also found that the anæsthetising body of the ether is the ketone group or parts of it, and that the great impurity of most ethers was mercaptan.

After a great amount of experimental work Wallis and Hewer have come to the conclusion that a combination of absolutely pure ether with some of the ketones gives an exceedingly fine anæsthetic body, and this they call ethanesal.

I have used this compound myself, and have had it administered to me, and I have no hesitation in saying that I consider it far superior to any other form of ether that I have so far encountered. There is little taste or smell, and after the operation one awakes almost at once with the very faintest taste of ether, which lasts but 2 or 3 minutes.

*Honorary Chairman's Address, Canadian Society of Anæsthetists, Niagara, June 3rd, 1921.

There is seldom any nausea or vomiting, and it is far less irritating to inhale than ordinary ether.

I have taken the opportunity to-day of acquainting you with what is perhaps the very latest work on the other side, in the hope that some of you may benefit by that knowledge, and probably help in working out the further development of this important advance in our knowledge of anæsthesia.

In the study of anæsthesia, there can be no better or surer way of improving our knowledge than by conferences such as this. Here are gathered together anæsthetists from every quarter of this great continent, all ready and willing to share their knowledge with their fellows for the benefit of mankind in general and anæsthetics in particular.

Now let me turn to administration of nitrous oxide-oxygen, chloroform, ether combination for nose, throat and abdominal surgery.

Let me begin by saying that I think the two great essentials for an anæsthetist to keep in his mind are:

(1) The safety and comfort of the patient; (2) The comfort and convenience of the operator.

If we take the first (and the most important) I think that in a great many cases the safety depends on the knowledge the anæsthetist has of some given method. By this I mean that it is safer for a man to use a method that he knows of, rather than to use another method, which in itself is safer, but of which he has no knowledge.

Now when we consider this question of safety and comfort of the patient we must include the pre-operative, operative and post-operative periods.

Take the pre-operative time: this includes the preparation before operation, etc.; then with a little care and forethought one can do much to help the patient. In my opinion there is no need for the drastic treatment that used to be meted out prior to operation: there is no need for that starvation and severe purgation that was in vogue years ago. The patient should be on a light diet and should be given an ordinary laxative. We must remember that any operation entails a certain amount of strain upon the patient; it calls for an effort on his part, so that he should not be enfeebled by starvation, purgation and by the giving of enemata. I have never heard it advocated that an athlete just prior to some big contest should be starved and purged—and indeed there is no sense in it.

Of course there are a certain number of cases when it is essential to have the bowel clear, and naturally one does not include these in the above statement.

Pre-operative medication has done a lot to rob operations of their terrors, and if the patient is given some morphine and atropine, or morphine, atropine and scopolamine hypodermically before the operation, they usually come to the table in a drowsy state with their mentality somewhat dulled, a great improvement on the custom of years ago; and this is apart entirely from the fact that they usually need less anæsthetics.

(N.B.—It is well to bear in mind that after hypodermic injections of morphine and atropine, and especially after morphine, atropine, scopolamine, the patient should not be allowed to walk to the theatre but should be carried).

During the last four years I have been endeavouring to find some anæsthetic or mixture of anæsthetics which could be used in combination with gas and oxygen, to produce a more complete relaxation when necessary, and in nose and throat work, to assist in the maintenance of anæsthesia.

I have tried a great many mixtures, and until the introduction of ethanesal a few weeks ago I was using as my adjuvant a mixture of chloroform and ether of equal parts. Now I have substituted ethanesal for ether, and find that the chloroform is only needed for nose and throat work, and for some of the abdominal cases.

The aim of all who have been working on this matter has been to induce a state of anæsthesia which was without danger, was pleasant for the patient, was adequate for the surgeon's needs, and was associated with the slightest toxæmia.

It must, I think, be fairly obvious that the after condition of a patient who has been operated on under gas and oxygen anæsthesia ought to be, in theory, and is, in practice, far better than when ether or chloroform has been given, for since the nitrous oxide and oxygen are non-toxic and are quickly eliminated, the patient returns to a normal state far more readily than after the more potent and toxic drugs.

We must remember that after an ether or chloroform administration it takes some time for the drug to be eliminated from the sytem, and this process of elimination must add to the strain on the patient.

The actual technique of the administration is quite simple and the necessary skill is readily acquired.

In 1917, when still in military surgery, I read a paper on nitrous oxide plus oxygen with regulated

re-breathing. I had not then had much opportunity to use this anæsthetic in civilian practice, but since then I have been using it for a great variety of cases.

In 1917 I thought that nitrous oxide plus oxygen was not well suited to abdominal work; I have since been trying to form a combination of anæsthetics which would give me adequate relaxation and yet would require the administration of the minimum of toxic substances. At the moment I am using as my relaxant a mixture of chloroform and ethanesal of equal parts, so that the anæsthetic becomes a combination of nitrous oxide-oxygen-ethanesal-chloroform, and with this I have been producing a type of anæsthesia which entails but little strain on the patient and is wholly adequate for the surgeon's needs. The actual technique I now employ is:

The patient is given morphine, atropine and scopolamine half an hour before the operation.

Gas and oxygen is then given in the proportion of about 1 of oxygen to 10 of gas, and as soon as the breathing begins to get deep and regular the gases are allowed to pass over the surface of a mixture of chloroform and ethanesal (equal parts) so that they pick up a small amount of mixture. In a few minutes the breathing becomes automatic, with slight soft stertor, thus shewing that anæsthesia has been obtained. The tap on the mixture bottle is then turned back, so that the patient is only having gas and oxygen and the operation is begun. The amounts of gas and oxygen must now be regulated to what the administrator thinks will be the correct amount; and this for the majority of cases is about 1-4 (*i.e.*, one of oxygen to 4 of nitrous oxide.)

In many operations it is quite unnecessary to give any more mixture, and the remainder of the operation is conducted under gas and oxygen.

Given in this way the anæsthesia is excellent both for patient and operator, whilst the after condition is extremely satisfactory. The patients readily regain consciousness, and in the majority of cases are not inconvenienced by nausea or vomiting.

In addition to this is the fact that they are hardly, if ever, conscious of the fact that they have had anything save gas and oxygen, for they do not, as a rule, have any taste or smell of ethanesal or chloroform. This lack of smell and taste of ethanesal and chloroform carries another point worth bearing in mind. Those working in the theatre—surgeons, anæsthetist, nurses, etc.—do not become impregnated with the smell and odour of ether or chloroform—an important point for their own comfort.

Using this method, I find that after a long afternoon in a theatre I can leave feeling quite fresh and well, and that the atmosphere of the theatre never becomes charged and laden with the vapour of ether and chloroform.

The small amount of ethanesal or mixture that one needs with this method is sometimes astonishing to those who are unfamiliar with it, for it is quite the usual thing to use but a drachm to a drachm and a half during a long operation such as the removal of a breast.

Operations such as amputations of the breast, hernias, varicocœles, and the like, are quite easily done under gas and oxygen and a very small quantity of either ethanesal or mixture; it is when one comes to the abdominal or nose and throat work that the difficulty begins.

For some time now many of us have been trying to get some combination to act as a really good relaxant for abdominal work.

Gwathmey of New York uses a combination of ethyl chloride, ether and chloroform, whilst McKesson of Toledo recommends a saturation with nitrous oxide. Personally I have not tried this method up to the present, and I have preferred to rely on my mixture of equal parts of ether and chloroform, but I hope before returning to London to have an opportunity of seeing Dr. McKesson use this method. I have been using this mixture for the last two years, and have only substituted ethanesal for ether during the last three months, with, I think, a great improvement, not only in the anæsthesia but also in the after-effect, and I am only now beginning to realise what a good relaxation I can obtain, and how easily it is to produce it almost at will, and within a few minutes.

It is hardly necessary to add that in giving this combination for abdominal work, a certain amount of intelligent anticipation is necessary on the part of the anæsthetist, so that the surgeon may find the abdominal wall quite relaxed when the time for sewing up has arrived.

Let me make this a little clearer:

Assume that we are operating on a case of appendicitis. The anæsthesia is deepened at the beginning, so that the surgeon may easily find the appendix and bring it outside; but when once outside the anæsthesia need not be of a deep character, and so we only give gas and oxygen. Later on, when we see that in a few minutes the cæcum will be returned to the abdominal cavity and the peritoneum sewn up, we again deepen the anæs-

thesia by turning on the mixture for a few minutes, and directly the peritoneum is stitched up we can again return to gas and oxygen alone.

My experience of abdominal work done in the manner I have tried to explain is that the patient is infinitely better both during and after the operation when the combination of nitrous oxide-oxygen-ethanesal-chloroform is given, than after any other combination or single anæsthesia that I have so far encountered.

Now let me for a moment turn to the use of this combination in nose and throat work. When I first began to use this method for nose and throat work, I had nothing to guide me, so far as I knew my friend Gwathmey, of New York, was the only man who had tried to give gas and oxygen for throat work, and he had only begun, for the war cut short his work in New York and he came over to Europe.

I will not weary you with an account of my earlier cases. Many of them were failures, and it is only by sticking to it and having such a cordial co-worker in Mr. Harmer, our senior throat surgeon at St. Bartholomew's, that we have been able to evolve a technique which I believe to be an excellent one for this type of operation and one which is infinitely superior to anything that we have tried before.

Briefly, our technique is:

1.—*Pre-medication*:—

Children, none—or at most 1-200 gr. atropine.

Adolescents—morphine 1-6 gr., atropine 1-150 gr.

Adults—Either Burroughs & Wellcome Hyoscine Compound, "A" or "B" according to size.

Hyoscine Compound "A" contains:

Hyoscine hydrobromate, gr. 1-100.
Morphine sulphate, gr. 1-6
Atropine sulphate, gr. 1-180.

and Hyoscine Compound "B" contains:

Hyoscine hydrobromate, gr. 1-100
Morphine sulphate, gr. 1-4
Atropine sulphate, gr. 1-150.

The injections are given half an hour before the time of operation.

The patient is then anæsthetised with gas and oxygen, and the anæsthesia deepened with ether or mixture until the breathing is deep, regular and slightly stertorous, the colour should always be *pink*. The face piece is then removed, a gag placed in the mouth for those cases in which it is necessary (*e.g.*, enucleation of tonsil), and the anæsthetic is continued by means of a tube placed in the mouth. Let me hasten to say that one of the astonishing things about this method is the small amount of mixture that is necessary to maintain the requisite anæsthesia. Indeed, in a certain proportion of cases hardly any mixture at all is necessary for the rest of the operation; that is to say, after the face piece has been removed. After that, as I have said, in a certain proportion of the cases gas and oxygen alone is sufficient.

In this connection I must mention that there is one particular type of case where I have been forced to use chloroform alone as my adjuvant. I refer to cases of diarthermy. In our throat department Mr. Harmer is treating cases of carcinoma of the tongue, fauces, etc. with the diathermy cautery, and I gather with excellent results. Now, occasionally in these cases there is a certain amount of sparking—either accidental or intentional; one cannot therefore have any ether in the adjuvant bottle lest there be an explosion, and must use chloroform. In a large number of these cases one finds that the best way to continue the anæsthesia is to pass one or two small rubber tubes through the nostrils and pass the anæsthesia into the post-nasal or endopharyngeal space; and this I do by means of a metal stirrup and tubes.

A still further development of this method has become necessary when dealing with certain plastic operations on the face, and with such conditions as laryngo-fissure.

The first occasion on which I used endotracheal gas and oxygen was on October 9, 1918, for a case of laryngo-fissure. In this case after the tracheotomy was performed, I gave gas and oxygen by means of a small catheter through the tracheotomy tube and with excellent result. Since then I have resorted to endotracheal gas and oxygen on many occasions.

In conclusion, let me say that the man who wants to give the nitrous oxide-oxygen-ethanesal-chloroform combination successfully and well must bear in mind that the patient's colour must always be pink, and that he must not give the mixture for longer than is absolutely necessary.

As his skill with the method increases, so will he diminish the amount of mixture that he gives, and by that amount will his patients benefit in their condition both during and after the operation.

# Case Reports

## CASE REPORTS FROM THE MONTREAL GENERAL HOSPITAL

W. H. Eakin

*House Officer in Pathology*

Case 1.—Hæmorrhage from a Solitary Tuberculous Ulcer of the Transverse Colon, associated with Tuberculosis of Lungs and complicated by Diabetes Mellitus.

M. G. H.—No. 4343—1921.—Male, 54 years of age, stableman, was admitted to the service of Dr. F. G. Finley, September 21-1921, complaining of cough, weakness, anorexia, thirst and polyuria.

In June the patient developed a "cold." About the same time nocturnal frequency of urination and an increasing thirst were noticed. In this period of about four months he lost 52 pounds in weight, he weakened progressively and the nocturnal frequency and polydypsia continued.

Previous to his present illness he had always been in good health. He denies venereal disease but admits drinking three to four quarts of beer a day.

Family History—Mother died of diabetes mellitus. No tuberculous infection in family known.

Condition on admission—Patient is thin, with evidence of recent loss of weight and dehydration of tissues (a dry inelastic skin). There is marked clubbing of the fingers. Axillary glands are palpable; superficial arteries somewhat thickened; heart normal; blood pressure, 140-90. Temperature 98; pulse 86, regular; respirations 32.

Respiratory system—Antero-posterior diameter of chest is increased, but right side somewhat flattened. The upper portion of the right side, front and back and upper axilla, are dull on percussion with diminished and altered breath sounds which in some portions are cavernous in character. The left chest is hyperresonant,, and the breath sounds vesicular. The patient has a slight cough with a small amount of purulent sputum. Urinalysis—Spec. grav. 1028; a trace of albumin, a few granular casts; sugar 2.5 %

Course of illness—While in hospital, a period of twenty-three days, patient was kept in bed, put on strict diabetic diet and became sugar free in four days. There was continuous fever of an irregular intermittent type; the cough was persistent with a small amount of sputum which after repeated examination revealed tubercle bacilli. Patient continued to lose both weight and strength. Six days after admission he complained of pain in the rectum and passed a small amount of red blood in the stool. Rectal examination failed to reveal the source of the bleeding. Three days later 10 oz. of blood were passed per rectum; on the following day one oz.; and again on the succeeding day a large quantity. At no time was there any abdominal tenderness or distension. Following upon the haemorrhages the patient rapidly became weaker and died October 14, one hundred and thirty-six days from the onset of illness.

As stated, he became sugar free four days after admission. He remained so for twelve days when excess of sugar again appeared in the blood. This reappearance of hyperglycaemia was accompanied by a slight fall in plasma carbonates which did not appear to be due to an acidosis but to loss of alkali resulting from the hæmorrhage.

Clinical Diagnosis—Pulmonary tuberculosis; pulmonary emphysema; tuberculous ulceration of the intestine, probably in the colon; diabetes mellitus; chronic nephritis.

Autopsy Report.—A 21-211.

Gastro-intestinal tract—With the exception of the sigmoid and rectum, which contained blood stained faeces, the intestines were collapsed. In the sigmoid the upper portion of the faecal material was not blood stained, and the demarcation between blood stained material and that free from blood was sharp. There was a solitary ulcer in the mid portion of the transverse colon. This ulcer, which lay transversely was 4 cm. in diameter and was situated opposite the mesenteric attachment. It was irregular in outline and the base was uneven due

to numerous nodular elevations. It contained neither blood nor blood clot. The serous surface opposite the ulcer did not show any gross evidence of tuberculosis. There were no other ulcers in the gastro-intestinal tract. Right lung—In the apical region and throughout the upper lobe there were numerous tuberculous cavities, some of which were traversed by thickened bronchi and blood vessels. The largest of these cavities was in the apex.

Summary and Remarks—A male, 54 years of age, who had no history of previous illness was admitted with chronic pulmonary tuberculosis with cavitation, diabetes mellitus, chronic nephritis, and emphysema of the lungs. During his ilness, a period of four months, there was continuous and increasing loss of weight and strength. This was accompanied by a persistent, slight cough with purulent sputum in which tubercle bacilli were found. Polyuria and polydypsia were present. On a strict diabetic diet he promptly became sugar free and remained so until hæmorrhage from the intestine complicated his illness The faeces contained bright red blood. For this reason and because no other source of the intestinal hæmorrhage could be determined, a probable diagnosis of hæmorrhage from tuberculous ulceration of the large intestine was made. This was confirmed by autopsy. Hæmorrhage from tuberculous ulcer of the intestine is, in the experience of this hospital. uncommon.

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## TUBERCULOUS MENINGITIS SIMULATING ENCEPHALITIS LETHARGICA HAEMORRHAGICA.

LEONARD C. DURSTHOFF

*Senior House Physician, Service of*

*Dr. C. A. Peters*

Case 2.—M. G. H.—No. 1998—1920,—Male, age 23, coloured, was admitted complaining of chilly sensations, headache, backache, abdominal discomfort, and soreness of the neck.

Previous History—He had had some febrile ilness at 4 years of age, pneumonia at 11 years, was gassed while with the army in France in 1917.

Present Illness—This began 10 days ago with headache, backache and abdominal discomfort. Since that time he has had one or two chills daily, folowed by profuse perspiration. There has been no epistaxis, cough nor expectoration. For the past six days he has been in bed.

Examination on admission—An extremely well developed and well nourished young man. Pupils equal and react to light and accommodation. There are no pathological reflexes. The tongue is coated and somewhat tremulous. Several small calcified glands are palpable in the right side of the neck. The heart is centrally located and normal. Temperature is 100, pulse 78, and regular with no dicrotism. Respirations are 28 to the minute. There are a few scattered fine crepitations over both lungs. There is no evidence of infection in the genito-urinary tract. The neck is slightly stiff. The blood count showed 7,000 white cells to the cmm. No malarial parasites were found. The urine was normal and the Wasserman reaction negative.

In view of the general clinical picture and the absence of malarial parasites a tentative diagnosis of typhoid fever was made and a blood culture was taken in ox bile. This remained sterile after several transplants. The Widal reaction was negative.

Course of Illness—From the time of admission until the time of his death, a period of ten days, he gradually became more and more drowsy and somnolent with irrational periods. Although he became unable to put his chin on his chest there was never any retraction of the head, nor spasm of the cervical muscles. He coughed four or five times daily but never had any expectoration. His temperature was remittent, ranging between 101° and 103° and his pulse gradually increased to the rate of 136 per minute. The white cells in the blood were never over 9,000 to the cmm. The ocular fundi, ear drums, and throat were normal. A second blood culture planted on various media was sterile. An X-ray examination of the chest showed a centrally located heart and a fine mottling throughout the upper third of each lung.

On account of the increasing lethargy and the persistence of the pain and stiffness of the neck, a lumbar puncture was done, when bloody fluid, not under pressure, was obtained. Smears from this fluid showed cellular elements of the blood in the same relative pro-

portion as in the blood itself. A Wasserman of this fluid was negative. A second lumbar puncture was done on the following day when similar fluid was again obtained. On the day of death he was very lethargic, but could be aroused and would obey simple instructions. The pupils were equal and reacted to light and accommodation. There was at times a slight internal strabismus alternating with a lateral nystagmus. His neck was a little stiff and painful. At times both arms showed definite spasms and in the purposeless movements, his left arm and hand were not as active as his right. There were no pathological reflexes. The diagnosis of encephalitis lethargica haemorrhagica was made.

Post Mortem Findings.—There was a widespread and very diffuse miliary tuberculosis and an acute tuberculous meningitis. This was most marked beneath the meninges.

Over the base of the brain there was free blood and the cerebro-spinal fluid was blood stained. In the pia-arachnoid there was fresh blood.

Summary and Remarks.—A negro, 23 years of age was taken acutely ill with the signs and symptoms suggestive of typhoid fever. During his illness, a period of ten days, signs and symptoms referable to the central nervous system developed. From two lumbar punctures blood stained fluid was obtained. The post mortem examination showed miliary tuberculosis and tuberculosis meningitis. The reasosn for making the diagnosis of encephalitis lethargica hæmorrhagica were:—(1.) Increasing lethargy; (2.) Negative laboratory proof of an acute infection; (3.) Absence of pathological reflexes; (4.) Involvement of eye muscles. (5.) Two lumbar punctures from which blod stained spinal fluid was obtained. (6.) There recently occured, in this hospital, a case similar in many respects to the above and from which lumbar punctures yielded blood stained fluid. This case post-mortem showed an extensive intrapial and subdural hæmorrhage and the histological findings in the central nervous system corresponded to those found in Encephalitis Lethargica.

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# Retrospect

## ON THE PARKINSONIAN SYNDROME

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A review of a paper by Dr. M. A. Souques read at the annual meeting of the Neurological Society of Paris, June 3, 1921, appears in the Revue Neurologique No. 6, 1921. The facts presented by Dr. Souques mark an important advance in our knowledge of this affection. Paralysis Agitans or Parkinson's disease is not a morbid entity. It is a syndrome, due to different causes acting on the same region in the brain. The nature of the lesion appears to be of much less importance than its site. Since the first description of the disease by Parkinson and shortly afterwards by Charcot and Vulpian, much has been written on the clinical history of the disease, but its etiology and pathological anatomy is still obscure and uncertain. The lesion has been looked for in the muscles, in the nervous centres, and in the endrocrine glands. Recent investigators place it in the corpus striatum and locus niger. The epidemic of encephalitis just experienced has given rise to so many cases of this syndrome that it has drawn attention to the possible infectious origin of the disease.

Recent investigations of the physiology and anatomy of the corpus striatum have shown that it is apparently an autonomous organ, a complete centre with its afferent tract coming directly from the optic thalamus, and its efferent tract going to the optic thalamus and the hypothalamic region. The anatomical division of the corpus striatum into two parts is arbitrary and artificial; embryologically the division is into the globus pallidus on the one hand and the putamen and caudate nucleus on the other. These two parts differ in their structure, their functions and their pathology. To the

former has been given the name paleo-striatum and to the latter that of neo-striatum. The two Vogts looked upon the corpus striatum as a sensori-motor centre with the functions of coordination and of inhibition. Through the-intermediary of the optic thalamus, it received either from the periphery, the cerebellum or the cerebral cortex stimuli which it elaborated and sent on to the hypo-thalamic centres, and thence by the extra pyramidal motor tract to the medulla and the cord. In the inferior animals the thalamus is the primitive centre for sensibility while the corpus striatum is the head centre for motility. When the cerebral cortex and the pyramidal tract appeared in the higher animals it lost its importance but still plays in man a considerable role as a motor centre. From anatomo-pathological investigations it is inferred that the organ is the centre of automatic movements and of muscular repose, and also one of the important centres of muscular tone. When it is destroyed, there is the abolition of automatic movements with muscular rigidity as a tetanic tremor. According to Ramsay Hunt the globus pallidus is a motor nucleus of the corpus striatum, and plays through the extra pyramidal motor system an identical role to that which the cortical motor centres play through the cortico spinal system; it exerts a control on the extra pyramidal motor neurones, that is to say, through its relations with the hypothalamic centres, it has a true control of the automatic and associated movements. It follows that the destruction of the large motor cells of the pallidal system produces paralysis agitans, that is to say, an increased tone, tremor and a paralysis of automatic movements. Just as the destruction of the small cells of the putamen and the caudate nucleus determine a choreo-athetosis or the syndrome of Vogt. So, finally, the destruction of both types of cells produce Wilson's disease.

In a last analysis one can consider paralysis agitans as a disease of tone. The centres of tone can only exist in motor cells, tone being a permanent reflex of which sensory fibres constitute the centripetal paths, and motor fibres the centrifugal paths. There are centres of tone in the anterior horn of the cord, in the mesocephalic cells, in the central grey ganglia and in the cerebral cortex. The most important centres of tone in man are without doubt in the brain, as complete section of the cervical cord, either experimental or from pathological conditions, shows.

The disturbance of tone explains the essential symptoms of Parkinson's disease, namely, the muscular hypertonus on which depends the disturbance of posture of the body, the facial expression and the phonation. The frequency of sympathetic disturbances, flushes, perspirations, dribbling of saliva and œdemas means the existence of sympathetic centres in the region, wherever it is, which is the site of the anatomical lesion. Brouwer places these centres in the caudate nucleus. Tretiakoff states that the locus niger is a sympathetic regulating centre. In defending this hypothesis, he argues the analogy of structure that Marinesco has observed between the cells of the locus niger and those of the sympathetic ganglia. It is possible that sometimes the pain, which one observes not infrequently in the course of Parkinson's disease may be explained by the neighbourhood of the optic thalamus.

To sum up, paralysis agitans would appear to be a syndrome dependent upon lesions of varying nature, but always affecting the same places. In exceptional cases these lesions may be macroscopical (tumors, hæmorrhages or softening,) but more commonly the lesions are microscopic, either infectious, toxic or ischæmic. In either case, these lesions will involve the corpus striatum, the locus niger, or the hypothalmic region—the future will decide between these lesions—and will cause a destruction more or less marked of the centres of tone.

In a later number will appear a retrospect on the Causes, Symptoms, Clinical Forms, Diagnosis and Treatment of this Syndrome.

# Editorial

## THE LABORATORY WORKER AND THE PRACTITIONER

IN its attempt to correlate subjective symptoms with particular laboratory findings the article by Professor John Tait on "*Marrow Pains*" *in Malaria and in Certain Other Acute Fevers* printed in this issue of our *Journal*, recalls the recent controversy stirred by Sir James Mackenzie's strictures upon present-day methods of medical education. It will be remembered that the distinguished heart specialist, in view of his own particular experience, was led to advocate a different line of approach towards the study of disease from the prevailing laboratory route, on which so much stress is laid at present. In the view of Sir James Mackenzie the general practitioner, and not the academic teacher using laboratory methods, occupies the best vantage-point for assessing defects in our medical knowledge and particularly for studying the *symptoms* of disease. Naturally his statement was qualified, and he also said: "The peculiar nature of the science of medicine prevents anyone realising how its advance can be made unless he has himself prosecuted definite inquiries and discovered the nature of the lack of knowledge. At this day there are many problems calling for solution, and on account of lack of knowledge we do not even know how to proceed to their solution. Not only that, but I would further state that the profession has such a confused notion of medical research that it does not realise that there are problems to be solved." In view of Sir James Mackenzie's special insistence on the symptoms of disease as offering a fertile field for investigation by the practitioner, Professor Tait's paper is of interest, for it deals with subjective symptoms, which, in respect at least of their locality, are interpreted through findings of the laboratory. Without presuming to express an opinion as to the ultimate truth of the relation suggested by Professor Tait between marrow involvement and pain, we may nevertheless note that the inquiry took origin not in clinical but in laboratory experience. Spite of the high significance of bone marrow to the physiologist and pathologist and, in certain special cases, to the clinician himself, bedside workers have scarcely as yet been in the habit of attributing any of the subjective symptoms of their patients to affection of this tissue. If any conclusion is to be drawn, it is that we should not be too particular in laying down hard and fast rules as to modes of inquiry into medicine, and further that occasional excursions by laboratory workers into clinical fields are beneficial and stimulating.

## ON THE RELATION BETWEEN MENTAL AND PHYSICAL EFFICIENCY

IN a recent Editorial in the British Medical Journal the writer discusses and emphasizes the importance of the results obtained in research work undertaken by Dr. Alfred Mumford to determine the relation between mental and physical efficiency in the pupils of the Manchester Grammar School. All physicians recognize the necessity of

bodily exercise to maintain a proper condition of health. Especially is this true in individuals of sedentary habits, and in the developing school child. The ancient doctrine of temperaments taught that an abnormal activity of certain organs of the body such as the liver and the spleen conferred on the individual distinctive characteristics. It is many years since the doctrine has been discarded. Recent research, however, shows a definite correlation between certain physical attributes notably the respiratory function and general mental and physical fitness. Dr. Mumford in his work also noted the close relation between improvement in the respiratory powers, and the general health in a group of rachitic children under treatment. As their breathing powers became developed their attacks of night terror and fearfulness disappeared, and they willingly associated in games with their companions. He determined therefore to carry on his investigations further, and find out whether there was any intimate relation between the respiratory capacity and their attainments in school. The first calculations were carried out according to the method of Professor Dryer of Oxford by measuring the largest amount of air a person can inhale after deep inspiration "the vital capacity". The results obtained showed a very definite relation between this vital capacity and school attainments during the early ages of school life, a relation which became less marked at the later ages of 16 to 18 years. It was found that intensive study for examinations tended to reduce the respiratory capacity for the time being, but the reduction was fully recovered after a holiday. These experiments led Dr. Mumford to attempt the measurement of the movements by a direct method. The time was noted during which a boy could hold his breath against a column of mercury some 40 mm in height. It was a test of will as well as of physique In an average class in one of the middle forms he found that the five top boys of the class held the mercury for an average period of thirty-three seconds, while the five bottom boys could only hold it for an average of 19 seconds each. In a matriculation form the five best boys held the mercury for an average of 31 seconds each while the five bottom boys held it only for an average of 23 seconds. In order to test the influence of competition a number of boys were made to repeat the test before the whole class. He found that the best ones improved their record, while the worst ones failed to reach their previous standard. Dr. Mumford considered that those who had good respiratory powers had not only a higher mental capacity for studies, but had also stronger wills, and powers in reserve which they could use in an emergency, while those with poor respiratory powers either could not or would not exert themselves further. This research is distinctively suggestive and should attract the attention of all physicians interested in the developing child and its education. The apparatus used by Dr. Mumford was an adaptation of the sphygometer with the substitution of a jacket for an armlet.

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## ON THE VALUE OF VARIOUS KINDS OF SOAPS AS ANTISEPTICS IN HAND WASHING.

MANY varieties of soaps are advertised as of value not only in cleansing the skin, but as having a definite antiseptic action. The actual value of such antiseptic action has been carefully tested by Dr. Norton of the Department of Hygiene and Bacteriology of the University of Chicago, and from a paper published in the Annual Report of the investigation of the Therapeutic Research

Committee of the American Medical Association we note the following facts.

The manufacturers of these soaps base their claims for antiseptic action on the phenol co-efficient of the antiseptic reagents used. Hamilton and also Syme working separately some years ago have shown that very few of the so-called antiseptics, with perhaps the exception of the mercuric iodid possess any antiseptic properties when mixed in soaps. In the examination which was a practical one, twelve different samples of soaps were used varying from the cheapest toilet type to the most expensive so-called germicidal or antiseptic soap. Hands were washed with each article in sterile water at 40°c., and then rinsed. Following this repeated washings and rinsings were carried out. From the various wash waters and rinsings plate cultures were made, and the number of bacteria estimated. Cultures were also made from the soap solutions after standing for periods of time up to five hours. The amount of soap used in each case was estimated by titrating with standard acid solutions, and was regulated to a strength of 0.5 per. cent.

The figures obtained by these various tests have proven that more bacteria are removed by washing with ordinary toilet soaps than when the more expensive soaps are employed. Moreover that the number of bacteria in the wash waters in every case remained practically the same. It was also noted that the rinsings even after repeated washings still contained large numbers of bacteria. Dr. Norton draws the following conclusions:

1. Ordinary toilet soaps remove the largest number of bacteria from the skin.
2. Absolutely sterile hands cannot be obtained by even repeated washings.
3. Soap solutions as produced in hand washing are not antiseptic.
4. The so-called antiseptic and germicidal soaps do not possess the qualities claimed for them.

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## SMALLER HOSPITALS AND THEIR CLINICAL POSSIBILITIES

THE life of country physicians is a laborious one and a matter of more serious moment, they are without the facilities for study and investigation. To correct these conditions steps should be taken to improve the great and increasing number of small hospitals throughout the country, so as to make them centres for clinical and investigation work for those within reach of them. Such a plan under efficient direction could be made much more useful than brief post-graduate courses that relatively few are able to undertake. To make these hospitals effective for such work they must be properly equipped with chemical laboratory and microscopical outfit installed in suitable, well-lighted, comfortable rooms. This would be all that would be required in quite small hospitals. Those in larger centres should in addition have an efficient x-ray equipment with the requisite accommodation and conveniences. These should be in charge of a fairly well-trained physician who should also have supervision of the laboratory. Except in the large communities only part of his time would be so occupied. A small separate building to house both laboratories would be desirable. In most of such places there would be a Health Department in which case the accommodation would meet the needs of both Hospital and Health Department.

It would be reasonable to ask the local governments to provide these buildings and equip all the laboratories. In some of the Provinces they aid in the building of local sanitoria for the care of tuberculous patients to the extent of 20 per cent of the cost, a very laudable policy; it would be as laudable to aid in increasing the efficiency of the smaller hospitals so as to make them more effective for the local public and at the same time, give more effective service to all classes, rich and poor alike, a matter quite as important as

the care of the tuberculous, important as that is.

If this scheme were devedoped as above suggested no doubt much benefit would result. The real good aimed at is to secure cooperation by the physicians themselves and bring within their reach facilities for training in better methods so as to enable them to cope with the newer problems constantly evolving through the advance in both clinical and laboratory activity so keenly pursued in all centres of teaching and investigation. The result of such plans will be in direct ratio to the value of the work done by each individual for, after all, the greatest benefit to anyone is obtained from the work he himself does. Further such organized work would develop systematic effort, more study and clearer thinking. The frequent meetings to be held would also, and this is important, train in giving incisive expression to well-fortified opinions, a faculty in great need of improvement in the Canadian profession. As in all other aims that are worth while, such results can be attained only "by the sweat of the brow."

In such good work there is no doubt of the sympathy and assistance of the larger centres especially the teaching faculties. For some months, the Ontario Medical Association has been sending one or two men to read papers or give addresses at local societies making request for them. That this effort has been appreciated is shown by the numerous requests that have been received.

It is to be hoped that there will be an expression of opinion on the part of the profession in the country in regard to this matter.

A. McP.

## Men and Books

**The Evolution of Modern Medicine:*** by Sir William Osler, Bart.

The appearance of this book is to be regarded as a very noteworthy literary and educational event, which will undoubtedlydo much to diffuse a knowledge of the History of Medicine among the rank and file of the profession, and to popularize the ideals which are emphasized through all its pages. In the Author's words, he has taken us with him on "an aeroplane flight through the centuries, touching only the tall peaks from which may be had a panoramic view of the epochs through which we pass." The wealth of illustrations, many of them from unusual sources and not previously published, were all selected by his own personal care with a view to the elucidation of the text, and add greatly to the value of the outline sketched for us by a master hand.

To those of us who remember the delivery, by Sir William Osler, in April 1913, of the Silliman Lectures on the History of Medicine, their recent publication by the Yale Press under the above title comes as the fulfilment of a long cherished hope. Turned over to the printers with his usual promptitude, the manuscript was immediately set up in type, but he himself held back the partly corrected galley-proofs until his death, awaiting in vain the return of that leisure of mind and heart which had been so rudely interrupted, first by the duties imposed by the great war, and then by the sad preoccupation induced by the loss of his only son; for their appearance now we are greatly indebted to the editorship of his friends and disciples, Fielding H. Garrison, Harvey Cushing, Edward C. Streeter and Leonard H. Mackall. In the Preface, Dr. Garrison, his most sympathetic interpreter, writes:

"These lectures are in effect a sweeping panoramic survey of the whole vast field, covering wide areas at a rapid pace, yet with an extraordinary variety of detail. The slow, painful character of the evolution of medicine from the fearsome, superstitious mental complex of primitive man to the ideal of a clear-eyed rationalism is traced with faith and a serene sense of continuity.

"This work, composed originally for a lay audience and for popular consumption, will be to the aspiring medical student and the hard-working practitioner a lift into the blue, an inspiring vista or 'Pisgah sight' of the evolution of medicine, a realization

*The Evolution of Modern Medicine. A series of lectures delivered at Yale University on the Silliman Foundation in April, 1913, by Sir William Osler, Bart., M.D., F.R.S., New Haven, Yale University Press, 1921, 243 pp., 107 illustrations.

of what devotion, perseverance, valour and ability on the part of physicians have contributed to this progress, and the creditable part which our profession has played in the general development of science.

"The editors have no hesitation in presenting these lectures to the profession and to the reading public as one of the most characteristic productions of the best-balanced, best-equipped, most sagacious and most lovable of all modern physicians."

To those familiar with the facts of Osler's early biography, who know something therefore of the sources at which his genius fed, these lectures have still another significance, revealing to an extent no other communication from his pen had yet done, the depths of his own inner life. The cultural influences of his early environment, his own enthusiasm for the great traditions of the past, and the note of personal consecration to an ideal of work and service that undoubtedly dominated his consciousness, all lent to his character that mental balance that may be termed *religious*, in the best sense of the word. It seems, therefore, a part of the poetic sequence of events that so often illuminates the pages of history, that the occasion of his last visit to this continent should have supplied the opportunity for the consummation of the spiritual avocations of his life, through the delivery of these Lectures under the Silliman Memorial; for this Foundation has as its specified object the illustration by means of such annual courses, of "the prescience and providence, the wisdom and goodness of God, as manifested in the natural and moral world, by the orderly presentation of the facts of nature or of history!" And here we have, written clear, in unwavering characters, Osler's *Credo*, the paean of his invincible optimism, his belief in the inherent greatness of man and in the power of those elements of reason, moral law and freedom that stretch within us, as Kant puts it, "in fields of illimitable grandeur," and his sense, also, of the relative values of the "uncharted spheres," which, though understood by us but dimly, yet "erect altars of righteousness within our hearts." "It is a glorious chapter in history," he concludes, "in which those who have eyes to see may read the fulfilment of the promise of Eden, that one day man should not only possess the earth, but have dominion over it."

How close his subject lay to his heart, is to be traced in the quotations from Shelley, his favourite among the poets, with which his book begins and ends. And then, with his own engaging *con moto* of style (to use Garrison's apt expression) he delineates to us, in clear continuity, the different strains of medicine, and paints, in bold succession, those various stages by which human reason has come to-day into its own. Through the "dark backward and abysm of time," and from the origin of medicine "out of the primal sympathy of man for man," we ascend to that first mountain-top of ancient Egypt, where, in the dawn of history, "after milleniums of upward progress, traced in the records of the stone age, civilization first sprang forth, Minerva-like, complete, from the ocean of oblivion." We next emerge upon "the glory that was Greece and the grandeur that was Rome"—Asklepios, Hippocrates, Alexandria and Galen. We are shown in succession the pale glimmer of Arabian and Byzantine Medicine, and the brighter gleams of the South Italian School and the rising French Universities, illuminating the black darkness of mediaeval medicine, steeped in Galenic rule; then the great sunburst of the Sixteenth Century due to the studies in anatomy, and physiology of Vesalius and Harvey, and to the inductive methods of Descartes. Following these advances we note the origin of modern clinical methods through the birth of pathological anatomy in the observations of Morgagni and his school; the revival of the Hippocratic method by Sydenham and the early French clinicians, Laennec, Bichât and the rest; the discoveries that revolutionized the middle nineteenth century by Lister and Pasteur; the victory of preventive medicine on this Continent in the control of yellow fever and malaria by the self-sacrificing investigations of Reed, Carroll and Lazear; and last, but not least, the splendid triumph of modern sanitation under General Gorgas in the hygienic reclamation of Panama!

Here, silent as on a peak in Darien, we stand at last and look in mental vision across the tossing waters and blue hills to distant Greece, and see there, as in a pageant, those far other days—"when were born," says Osler, quoting Lucretius, "out of the night, the blinding night"—"*O Graiae gentis decus*"—the company of men whose thoughts made our thoughts, and whose ways made our ways,—the men who first dared to look on nature with the clear eyes of the mind."

Profoundly moved by the tale of human achievement and by the glory of man's spiritual advance, tenderly and with reverence of heart, do we receive these sprays of laurel that are garnered for us here, from the stately garlands of the past, by the hand of one whose own name is now numbered with the great ones of all Time.

MAUDE E. ABBOTT

# Abstracts from Current Literature

## SURGERY

**Reconstruction of the Common Bile-Duct.** WALTON, A. J.: Brit. Jour. Surg., October, 1921.

THE author reviews the causes of destruction or permanent obstruction of a portion of the common duct.

1.—Accidental injury of common duct during operation of cholecystectomy—much less common than was at one time believed, probably less than 1.5%. Less frequent since the adoption of the technique of beginning the removal of gall bladder from the cystic duct end, rather than from the fundus. Only positively ensured against by exposure of all three ducts, hepatic, cystic and common, before the application of clamp or ligature. The danger of clamping the common duct in picking up a divided, retracted and spurting cystic artery must not be overlooked. If the injury be recognized immediately, satisfactory repair can usually be attained but if overlooked a biliary fistula results and by the time secondary opeation is attempted the lower end of the duct is reduced to a fibrous cord.

2.—Injury of the common and hepatic ducts owing to congenital absence of the cystic duct. The author reports a case (illustrated) in which the hepatic ducts entered the proximal side of the neck of gall bladder, the common duct emerging from the distal side.

3.—Early chronic pancreatitis—Operation for colic reveals no stones, no dilatation of gall bladder or ducts but the head of pancreas is hard and nodular and a probe fails to enter duodenum.

4.—Advanced chronic pancreatitis with obstructive jaundice. Operation reveals a distended gall bladder and ducts filled with "white bile"—so-called. Here it is safest to immediately form an anastomosis between duodenum and supra duodenal portion of common duct.

5.—Carcinoma of gall-bladder and ducts.

6.—Carcinoma of head of pancreas.

7.—Obstruction of common duct from scar tissue either within or without its lumen.

Operations undertaken to overcome the foregoing conditions are:—

1.—Direct suture—Suitable only when the injury to the duct is recognized early or in cases of excision of a stricture. The author condemns the use of the T tube.

2.—Lateral choledochenterostomy—also condemned.

3.—Re-formation of an absent common duct.

The author reviews historically the procedures adopted and discusses the limitations and difficulties of each. He then describes the technique of an operation he has devised and used with satisfaction in six cases (reports appended).

Briefly, the steps of the operation require exposure of the upper patent end of the bile duct with introduction and suture of a tube; the cutting and turning downward of a flap from the anterior surface of the duodenum; suture of the upper portion of the gap in the duodenum with introduction of the tube into the portion left open; turning upward of the duodenal flap to cover in the tube.

A. T. BAZIN

**Transfusion Reactions and Citration Within the Needle.** FRANK W. HARTMAN.: Jour. Ameri. Med. Assoc., January, 1922.

THE author discusses reactions that occur in transfusion by the citrate method. Those occurring during administration are signs and symptoms of acute cardiac dilatation, cough, praecordial distress, rapid heart action, etc. Besides these, which are readily controlled, by slowing up the transfusion, the ordinary signs of transfusion of an incompatible blood are so well known that they only require mentioning. They are headache, vomiting, pain in the back, cyanosis, ecchymosis and clonic spasms. These always come on during the transfusion of the first 75 c.c. He discusses in detail the reactions which occur after the administration which always come on within the first three hours. These embrace symptoms of fever, from 100 to 105 , beginning one to three hours after transfusion, and lasting sometimes one to three days, chills or chilliness, nausea, vomiting, urticaria and malaise. It is considered that most of such symptoms are due to incipient coagulation changes in the transfused blood, possibly due to blood containing thromboplastin and thrombin, due to abrasion or disintegration of the platelets, and setting free of the thromboplastic elements. Consequently in all methods of transfusion by the citration method the less the blood comes in contact with substances such as glassware, rubber tubing etc., the better. The shorter the time the blood is outside the vessels and the less alteration in its temperature the less will be reactions due to the above. The less stirring the blood has and the less aeration the fewer reactions there will be.

He describes and illustrates a compact apparatus of bottles in which a negative or positive pressure is readily induced by a two-way syringe. By the needle, which has a double nozzle, he is able to introduce citrate at the base of the needle, so that the blood receives its citration immediately it leaves the donor's vein. In 1918 when he used this apparatus his reactions, in 60 cases, were 38.3%. Of these cases 46 were done for pernicious anaemia, with reactions in 20 cases, or 43%. With a newer apparatus in 40 cases he claims his reactions were only 20%; and in pernicious anaemia he had 3 reactions in 15 cases, or 20%. He claims a reduction of reactions of 50% in his series. The article suggests the principle used in the Robertson citration bottle apparatus, though the factor of introducing citrate proximal to all the rubber tubing is new. A large series of cases of transfusion by the citrate method is mentioned in which the reactions vary from 15% to 65%. The author's percentage of 20% in his last 40 cases is considerably below the average noted in the literature of most operators.

CHAS. K. P. HENRY

**Pernicious Anaemia With Special Reference to the Spleen and the Large Intestine.** MAYO, Wm. J.: Ann. of Surg., September, 1921.

PERNICIOUS anaemia is a disease in which there is progressive degeneration of the red blood cells with permanent changes in the production of these, associated with spinal cord changes of a degenerative nature, achlorhydria and glossitis. The etiology is unknown, the early symptoms are often indefinite, and when the disease is diagnosed it is not curable. It is demonstrated that the actual perversion of the red cell formation lies in the bone marrow but the cause of this is quite unknown. The function of the spleen in cases of pernicious anaemia has been extensively investigated in the Mayo Clinic. Prior to No-

vember 1st, 1917, 50 splenectomies were done for pernicious anaemia. It was noted in following up these cases that many showed a marked gain in weight, there was improvement in the percentage of haemoglobin, on an average of from 36% to 72% and with a red cell count increased on an average from about 2,000,000 to more than 4,000,000. Subsequent to the above date the operation was discontinued for 3½ years when a follow up of the above cases showed that 21% survived 3 years or more, thus living 2½ times as long as the average in a similar group of cases of pernicious anaemia at the same stage of the disease who had not been operated on. In addition 10 (6-10%) were alive after 5 years. A synopsis of this series showed that the average life of pernicious anaemia cases after splenectomy was prolonged in 33% of cases, and that there was hope of cure in about 10% of cases. It was noted that after splenectomy the course of the disease was ameliorated, that the relapses were less severe, and that the cord changes were less rapid. It is well known that the spleen breaks up deteriorated or weakened red cells. In pernicious anaemia the cells appear to be born feeble, and the spleen destroys them faster than it does normal red cells. This has been shown by Winifred Ashby who showed that the destruction of transfused red cells in pernicious anaemia was not so rapid as the cells of the individual in many cases. The pathology of the spleens removed was indefinite, disappointing and of no value in forming an opinion as to the cause of the disease. In the first 19 cases there were 3 deaths and none in the last 40 cases. All splenectomies should be preceded by one or more transfusions of blood, and it is useless to do a splenectomy in the terminal stages of the disease. The relation of the large intestine to pernicious anaemia is discussed and it is noted that the frequency of cancer and tuberculosis in the first part of the bowel is greater than in other portions of it. In these portions they produce, without accompanying haemorrhage, very quickly an anaemia much more severe than cancer or tuberculosis in other portions of the body with the one exception of cancer of the fundus of the stomach. The frequency with which it has been noted that the above exists suggests the importance of intestinal toxins in the production of pernicious anaemia. There is no proof, however, that there is any such toxin absorption which produces anaemia. It has been noted that the intestinal parasite Balantidium coli occurs as a flagellate parasite which is quite common in the pig. Quite a number of cases have been noted of the presence of this parasite in man where it is situated in the intestinal wall, later in blood vessels and organs and in many cases encysted. In the intestinal wall it produces ulcerations. In the human there has been associated with its presence an intense anaemia with the associated cord changes and in some cases a haemolytic agent has been present. In chronic cases eosinophilia has not been noted. The author does not claim that this is a cause of pernicious anaemia but draws an analogy between the anaemia produced by it and that seen in other pernicious anaemia cases. Even when present it may not be found in the stools if it has penetrated the intestinal wall. Apparently it produces death in all cases. Pernicious anaemia itself destroys over 6,000 lives yearly in the United States. Synopsis: In pernicious anaemia very immature bone marrow red cells are thrown into the blood stream where the spleen breaks them up rapidly. The vicious circle is often successfully interrupted by removing the spleen with an increased life period for the red cells. There is no proof advanced as regards the intestinal or any other etiological factor of pernicious anaemia. Blood transfusions as frequently as required and splenectomy is the treatment offering the best results.

CHAS. K. P. HENRY

**Pre-Operative Preparation of Patients with Obstructive Jaundice.** Walters Waltman: Surg., Gynæc. and Obstet., December, 1921, vol. 33, page 651.

IN order to determine the cause of the very free bleeding of jaundiced patients following operation, the writer investigated the records of the Mayo Clinic during 1918, 1919 and 1920. He found that out of 29 patients with obstructive jaundice at the time of operation the cause of death in 50 per cent. was intra-abdominal hæmorrhage. Death occurred in from 1 to 7 days after operation, probably due to continued oozing from traumatized surfaces. It was found in most cases that post-operative hæmorrhage occurred when the coagulation time of the venous blood was longer than 9 minutes. To determine the coagulation time Lee and White's method was used. One cubic centimeter of blood is withdrawn from a vein by means of a syringe and placed in a test tube, both having previously been washed with normal salt solution.

The coagulation time may be shortened by the intravenous injection of 5 cubic centimeters of a 10 per cent. solution of calcium chloride in redistilled water, after three injections on successive days. The calcium is also believed to combine with the bile pigments in the blood rendering them less toxic. Calcium by mouth has no such effect, and takes at least three days before any result is noticed in the coagulation time. Intravenous injection gives immediate results. To supplement the intravenous injection of calcium, 100 grains of calcium lactate was administered by mouth daily for 5 days. The patient was kept on a carbohydrate diet and given 4000 ccm. of water by mouth to facilitate elimination. The amount of glucose was also increased by using the Murphy drip proctoclysis of 15 per cent. glucose solution in tap water, one hour on and one hour off.

The maximum benefit from this regime is reached in four days. If the patient does not respond, blood transfusion is indicated 24 to 48 hours before operation.

GEORGE A. FLEET

**Caries of the Hip-Joint.** BRADFORD, E. H.: Surg. Gyn. Obstet., December, 1921.

IN this interesting paper Dr. Bradford proceeds to prove, from cases under treatment at the Massachusetts Hospital School, the inferiority of plaster spicas to the traction abduction splint, in the treatment of hip disease.

Cure is to be obtained in this distressing affection by checking the crowding together of the diseased surfaces in acetabulum and femoral head. Plaster spicas do not accomplish this, nor do they in many cases afford sufficient immobilization. Dr. Bradford further states that to be content with a short spica in the treatment of hip caries is to be satisfied with inadequacy. The splint itself, which is meant to be used in the acute stage with crutches, should not be applied until extreme flexion or abduction deformity is corrected. By its use the leg is kept in the abducted position under traction, while in the convalescent stage it serves as a perineal crutch. Its continued use is indicated so long as muscular spasm is present, while traction can be gradually diminished as the spasm subsides. Dr. Bradford's claim, substantiated by end-results obtained, is that by the early and thorough use of the splint, caries of the hip-joint can be definitely cured with practical restoration of function.

J. A. NUTTER

**Some Observations upon the Treatment of Hip-Joint Disease.** FISH, JOHN E.: Surg., Gyn., and Obstet., January, 1922.

THE writer refers to the numerous cases of hip-joint tuberculosis sent to his institution from all over Massachusetts and to the very varied methods of treatment found

in use prior to their entry. Lack of uniformity in treatment is described as woeful, and attention is especially drawn to the apparent failure of the plaster-of-Paris spica as a routine method of treatment. This failure is notably shown as regards the prevention of deformity at the hip, many cases showing marked deformity who had been treated by this means for months and even years.

Dr. E. H. Bradford's abduction splint was tried in several such cases, with results much improved.

One case of undoubted hip-joint tuberculosis is reported. The patient a boy of twelve years, obtained, after four years of treatment largely by the use of the Bradford abduction splint, apparent recovery without shortening and with good motion in all directions. Practically without exception cases treated in this way from the first have made good recoveries with motion, which has not been found to be true in the much larger number of cases treated by the plaster spica. J. A. NUTTER

**Reconstruction of the Shoulder.** WHEELER, W. I.: Brit. Jour. of Surg., October, 1921, vol. 9, page 247.

THIS case report concerns a pensioner of 25, the upper end of whose humerus (the head and several inches of shaft) had been blown off by a high explosive shell. The arm hung helplessly by a pedicle containing vessels and nerves.

A long graft was taken from the patient's tibia and driven into the freshened upper end of the shaft of the humerus after the scar tissue had been removed. The upper and free end of the graft, about five inches in length, was placed in contact with the freshened genoid and acromion and coracoid processes. The extensive wound was covered by a muscle and skin flap from the chest. The arm was held in an abducted position by a splint, and the graft became fixed above and below. A very useful arm was the result. Much hypertrophy of the graft at the points where it needed most strength is strikingly shown in the x-rays. The author appends a list of fourteen points about bone grafts which may be read with interest and profit. J. A. NUTTER

**Reconstruction of Ankylosed Knee-Joints.** WHEELER, W. I.: Brit. Jour. of Surg., October, 1921, vol. 9, page 242.

THE author reports a case of bony ankylosis of both knees in a child of 11 years. following acute osteomyelitis of both tibia. Murphy's method of pedunculated fibrofatty flaps was used, while the x-rays taken after operation show that practically the whole of the upper tibial and lower femoral epiphysis were removed.

The case was most unexpectedly painless in its after-treatment, this being due in the author's opinion to the complete removal of any remains of the lateral ligaments and joint capsules which carry the sensory nerves. It is interesting to note that Putti advises against arthroplasty in children on the score of their inability to suffer what he considers to be the inevitable pain of the after treatment.

With regard to lateral instability ot the knee joint, so great a bugbear in connection with this operation, the author points out (1) that the femur was grooved from before backwards to admit a corresponding elevation on the summit of the tibia and (2) that if no lateral movement is allowed during repair there will be a condensation of the connective tissues on each side, which will form new lateral ligaments. Results were excellent. J. A. NUTTER

## UROLOGY

**Clinical Studies on the Use of Mercurochrome.** YOUNG, HUGH, H., et al: Jour. of Urology, vol. 5, No. 4, April, 1921.

THIS is a report in experiences with Mercurochrome, over a period of two years from the introduction of the drug, in which it is claimed that the early expectations of its great value have been realized. The disadvantages of the drug are in its occasional irritating action and the staining of clothing, etc., which results. The introduction of the water-soluble sodium salt is responsible for the diminution in the amount of irritation. The excess of alkali proved to be responsible for much of the irritation. The stains are easily removed from the skin by the use of acid, alcohol, vinegar, permanganate and oxalic acid solution. The stains on clothing are more resistant.

Reports of its use clinically may be briefly summarized according to the conditions in which it has been used:

First—Acute Urethritis.—Solutions of 1 per cent. are usually well borne in the urethra, but occasionally they may prove irritating and a weaker solution must be used. Solutions of ¼ per cent. to ½ per cent. are probably most satisfactory in producing the necessary germicidal effect and are always non-irritating. Solutions should be freshly prepared and occasionally substitution of weaker antiseptics should be employed.

Second—Chronic Urethritis.—The most satisfactory results of mercurochrome in the urethra have been in chronic urethritis, where the drug is used as an instillation and combined with the necessary instrumentation. Where the chronic posterior urethritis has been associated with chronic prostato-vesiculitis it has had good results. The dye has been recovered from the prostatic secretion by massage, more than a week after its injection. Young's method is as follows: The urethra is irrigated and the bladder filled with sterile water, normal salt or weak permanganate solution; the prostate and vesicles are massaged. The bladder is then emptied by voiding and the instillation of the mercurochrome solution made to the deep urethra.

Third—Cystitis.—Remarkable results are stated to have been obtained in many cases of long-standing cystitis. Where there is infection of the kidneys or of the prostate, naturally good results have not occurred. The drug has been found of great value in infection due to B. coli, following instillations of 1 per cent. solution. Cleansing of the bladder with sterile water or normal salt solution preliminary to the injection of the mercurochrome is essential, and injections are repeated according to the tolerance of the patient. It is best to begin with a ½ per cent. solution.

Fourth—Pyelitis.—The authors found that mercurochrome is as good a germicide in the renal pelvis as 1 per cent. silver nitrate solution, with the advantage that painful reactions do not follow the use of mercurochrome. The drug is of less value in coccus infections of the kidney pelvis.

Fifth—Venereal ulcerations, chancroids, buboes. Dressings with mercurochrome solution or paste have had splendid results.

Sixth—Chronic discharging sinuses.—Mercurochrome has been found valuable in discharging sinuses, especially those following the removal of tuberculous kidneys or epididymes. A 1 per cent. solution may be injected gently into a fistula, without harm, daily.

The article contains abstracts of clinical results obtained by other observers, and of some special cases treated by mercurochrome, given in detail.

F. S. PATCH

## UROLOGY

**Contracted Bladder.** FRONTZ, W. A.: Am. Jour. of Urol., vol. 5, No. 6, page 491.

THE author points out that the majority of infections of the bladder are secondary to an obstruction to the out-

flow of urine from the bladder or to some extravesical disease. The condition he describes in this paper is one exception to the rule and apparently occurs without any known cause. The condition was first brought into prominence by Hunner under the term "Elusive Ulcer."

Under symptomatology the author emphasizes certain symptoms such as marked frequency of micturition extending over a long period and accompanied by pain in the suprapubic region when the bladder becomes full. He also points out that the symptoms are out of all proportion to the signs, in fact very frequently the urine may be quite normal. The examination of the bladder reveals simply a contracted bladder with puckering of the mucous membrane in one or more areas. If, however, the bladder is over-distended, a crater will be seen to form in one of these areas accompanied by bleeding.

Under pathology he shows that the lesions are submucous and consist in an infiltration of the submucous tissues, and later of all the coats of the bladder, by small round cells and fibrous tissue.

Under treatment he states that in the early stages benefit is derived from repeated distension of the bladder but that after the condition has advanced, excision of the infiltrated area is the best means of obtaining a cure. In those cases in which it is impossible to excise the ulcer he recommends deep cauterisation of the cratered area.

WM. HUTCHINSON

**Diagnosis and Treatment in Pathologic Conditions of Urinary Tract in Children.** STEVENS, WILLIAM E.: Jour. of Am. Med. Assoc., vol. 77, October 1st, 1921.

THE paper is presented to emphasize the value of modern urological methods in the diagnosis and treatment of pathological conditions of the urinary tract in children. Cystoscopes are now available of a calibre of 16 to 18 French, by means of which cystoscopy and single ureteral catheterization of female children, as young as seven months, is possible.

The cases examined and treated by the author have ages varying from 12 months to 14 years and comprise tuberculosis of the kidney, diagnosed and operated; hydronephrosis and pyelonephritis.

The author draws particular attention to the possibilities of treatment of pyelitis by pelvic lavage.

F. S. PATCH

## ANÆSTHESIA

### COMPARATIVE STUDIES ON RESPIRATION

**A Preliminary Stage in the Progress of Ether Anaesthesia.** SMITH, EDITH PHILLIP, from the Laboratory of Plant Physiology, Harvard University. The Jour. of General. Physi. November 20th, 1921.

IT is pointed out that to study the effects of anaesthetics on respiration, it is desirable to use plants in order to eliminate the complication of muscular action and its influence on the rate of respiration. This study is done under conditions where the anaesthetic was the only variable. Wheat seedlings were used, aseptic precautions observed. Solutions of ether in distilled water, 1 percent, 3.65 percent, and 7.3 percent were used. In all, the first effect of ether is a depression of C O 2 production, that is, rate of respiration. This is followed by a rapid rise above the normal which is in turn followed by a fall. Here it is pointed out that a preliminary depression has not been previously noticed except by Irwin, in his results on frog's eggs and fundulus embryos. With the three other percentages the respiration is ultimately reduced to approximately the same level. The greater the concentration, the less time is required to produce the result. Even when respiration has been reduced below normal, recovery is possible upon removal of the ether and in time, appears to be complete. If, however, the rate is too far depressed, no recovery is possible. The importance of the initial depression must be reckoned with in any attempt at a general theory of anaesthesia. Attention is drawn to some questions arising out of the interpretation of these results, for example; at what points are stimulation, anaesthesia, and toxic irreversible changes established? These must be left for future experiments to decide.

WESLEY BOURNE.

## MEDICINE

**An Analysis of One Hundred and Eighty-two Cases of Cancer of the Stomach. with special reference to the incidence of pre-existing ulcer.** From the Medical Clinic of the University of Pennsylvania. TAYLOR, S. P., AND MILLER, T.: Amer. Jour. Med. Sci., December, 1921,

THIS study was undertaken with the idea of making available the data on gastric cancer, which has been accumulated in the clinic during the last ten years, and also to determine what evidence there was of any pre-existing ulcer.

The cases were divided into two groups: (1) those giving a history suggestive of pre-existing ulcer, and (2) those giving a history of a progressive downward course without previous gastric symptoms. In group (1) all cases were included with any previous gastric symptoms, whether typical or not of ulcer, and yet they amounted in all to only 31, or to 17 per cent. of the series.

Pathologists do not agree on the percentage of cases of carcinoma which develop secondarily to ulcer, and a number are quoted whose views vary from 71 to 5 per cent. Clinically there is a similar diversity of opinion. Smithies, Moynihan, Deaver, C. H. Mayo and others being quoted as believing that a history strongly suggestive of ulcer, could be obtained in a large percentage of carcinoma cases. Friedenwald on the other hand, who carefully analysed a thousand cases of carcinoma, found a suggestive history in only 7.3 per cent., Also the facts that carcinoma of the duodenum is rare, whereas ulcer is common, and that in proved ulcer cases malignancy rarely develops, makes these writers think that perhaps the small percentage is correct.

Over eighty-five per cent. occurred between the ages of 40 and 69, and there were three times as many males as females, and all were white but two, who were negroes.

Pain was the chief complaint in 55 per cent,, and was one of the principal complaints in 88.5 per cent., and in 94.4 per cent. of these it was in the epigastrium. When pain was referred from its original site to some other place, in 50 per cent. of the cases it was to the back. Relief of pain as a result of various circumstances was due in 60 per cent. to vomiting, and less often to eating, belching, bowel evacuations, applications of heat, etc.

Constipation, impairment of appetite, vomiting and nausea occurred in a large percentage of cases, whereas hæmatemesis was mentioned in only three cases. The average loss of weight was 30 pounds.

In the ulcer-before-cancer group, the average duration of symptoms was 10.5 years, and in these the duration of what might be called symptoms due to malignancy was 4.5 months. In the whole series, the average period of cancer symptoms was 8.6 months. These figures agree with other observations.

The age incidence in the ulcer-before-cancer cases shows almost thirty per cent. of the cases began in the fifth decade, and about twenty-five per cent. in both the fourth and sixth decades. When this was compared with the age incidence in a series of benign ulcer cases, it was found to be much later, showing that either

ulcer developing late in life is more apt to become malignant, or that the early symptoms were really not due to ulceration but to slowly developing malignancy. Previous history and occupation seemed to have no bearing on the condition, there was a history of other cases of cancer in the family in 8.8 per cent.

A mass was palpable in 61 per cent. emaciation noted in 82.9 per cent., tenderness in 55.5 per cent., and abdominal rigidity in 43 per cent.; visible peristalsis was noted in only 30 cases, but this the writer thinks may not be a correct figure, as this sign has often to be carefully and repeatedly looked for, and as the series included many cases of retention, he thinks it might have been found more often if searched for. Enlargement of the left supra-clavicular lymph glands occurred in 7 cases, and in no case on the right side.

Most cases showed a moderate secondary anæmia, the lowest count being 20 per cent. Hbg. and two million red cells. There was a moderate leucocytosis in 31.2 per cent., there being a leucopenia, or normal white count in the majority of cases. The stools were tested for blood in only 97 cases, and only 53.6 per cent. of these gave a positive reaction. This small percentage of positive reactions may be due to the fact that great care was taken to have the patient on meat free diet for several days before the test was made.

Gastric analysis was done in 155 cases; 53.6 per cent. showed retention, 68.4 per cent. showed no free H.C1, and 12.9 a low H.C1 content. Where there was pyloric involvement, or involvement of the lesser curvature, probably producing some stenosis, the acid figures were higher. Of 83 Wassermann tests done, only one was positive. Blood pressure was estimated in 119 cases, and the average systolic pressure was 118.

There were x-ray reports on 125 cases. Carcinoma was diagnosed in 121, in 3 the findings were said to suggest carcinoma, but that the evidence was inconclusive, and one only was wrongly diagnosed as adhesions and later proved by operation to be carcinoma.

Of the cases operated upon, removal of the growth was attempted in only 28 per cent.; in one half of the remainder no surgical interference of any kind could be attempted, showing that judging by this series, of the patients coming to operation for gastric cancer about one-third are given a chance of cure, one-third are treated palliatively, and for one-third nothing can be done.

The analysis of this series is interesting, showing as it does the small percentage of cases with a history suggestive of ulcer, and also that in spite of the small percentage of what we generally consider signs of advanced disease, such as palpable abdominal mass and visible peristalsis, yet at operation 30 per cent. were beyond even palliative measures.

That we should not rely on any one test, is shown by the fact that the positive reaction for occult blood was present in only 53 per cent. of cases, though in the gastric analyses the characteristic findings of low or absent free H.C1 was pretty constant. That the x-ray reports gave correct diagnoses in more than 96 per cent. and was wrong in only one instance, shows what can be done in well-trained hands by this means. R. H. M. HARTISTY

**Therapy in Neurosyphilis, with Particular Reference to Intraspinal Therapy.** SCHALLER AND MEHRTENS: Arch. of Neurol. and Psychiat., January, 1922.

THIS report consists of 208 cases of neurosyphilis treated by intraspinal medication. Seventy-five patients were given thorough treatment, receiving from 16 to 18 intraspinal injections. Altogether, 1500 intraspinal injections were given. All the cases were treated by the intravenous and intramuscular method before receiving intraspinal medication.

The conclusions of the authors are very favourable to the intraspinal method of treatment. The intravenous and intramuscular therapy is more efficacious in the meningeal, vasculomeningeal and diffuse types. The most useful field for intraspinal therapy is that of the meningo-parenchymatous types, including tabes. Patients with optic-atrophy and neurosyphilis without cerebro-spinal fluid reaction receive no advantage from intraspinal medication. Paretic patients should be given a trial, but the results are not very satisfactory. G. S. MUNDIE

**The Intraspinous Treatment of Neuro-Syphilis.** SICARD AND PARAF.: Rev. Neural., 27 : 1033, October, 1920.

THE authors cite their experience in the treatment and subsequent observation of a series of 14 cases, treated by the intraspinous route only, and have noted practically no improvement except where this method of treatment was supplemented by intravenous and intramuscular injections.

The cases treated were for the most part tabes and general paresis. They believe that the chief value of the method lies in the increased meningeal permeability set up by the intraspinous injection, and suggest, as a safer and more efficient substitute, the injection of sterile saline. This must always be carried out in association with intensive antisyphilitic treatment by the venous and muscular routes.

They report two sudden deaths following the subdural injections. In their hands, the intraspinous administration of arsphenamized serum did not produce the results reported by Marinesco, Swift and Ellis, and others.

F. H. MACKAY

**Arteriosclerosis.** EVANS, G.: Practitioner, January, 1922.

THE author discusses the nature of arteriosclerosis, which he considers to be an arthritis. His observations lead to the conclusion that the bacterial toxins, as the best known causes of infection, are the provocative factors. Old age induces arteriosclerosis only in so far as it allows time for chronic bacterial infection to have its way, while, at the same time, the resistence of the arterial walls to infection, with diminishing tissue vitality, is gradually overcome.

The prevention of arteriosclerosis is attained by clearing up the chronic infections in the body. The author insists that arteriosclerosis and Bright's disease are so closely associated as to lead one to the conclusion that some at least of the causes of Bright's disease are concerned in the production of arterial disease.

C. F. MARTIN

**The Blood Sugar Tolerance Test as an Aid to Diagnosis in Gastro-Intestinal Cancer.** FRIEDENWALD, J. AND GROVE, G. H. Am. Jour. Med. Sc., January, 1922.

THE authors continue their observations on the diagnostic value of the blood sugar tolerance test in malignant diseases of the alimentary tract. They have already drawn attention to the fact that the sugar curve in alimentary carcinoma differs from that of cancers elsewhere in the body. The fasting sugar is high, and is followed by an initial rise up to 23 per cent., or higher, within 45 minutes after the ingestion of the dextrose, and remains at this level for at least two hours. The positive and negative values of the test are duly considered. C. F. MARTIN

**Value of Vagus Stimulation in Paroxysmal Auricular Tachycardia.** BROWN, D. C.: Heart, vol. 8, No. 4, August 1921.

THE writer outlines the cardinal clinical features of paroxysmal tachycardia (i. e.—the auricular form, not the ventricular) as follows:—

(A).—Tachycardia, rate usually under 225 per min.

(B).—The onset of the rapid pulse is abrupt.

(C).—The condition is not permanent, the termination of the attack being almost as sudden as the beginning.

(D).—The symptoms complained of are 'tightness' in the chest, shortness of breath, and cardiac palpitation.

He reports in detail one case in a male aged 38 years, showing the cardinal features above enumerated, but quite remarkable in that: the attacks could be cut short by almost any form of vagus stimulation. which is not often the case. Pressure on the vagi in the cervical region, pressure on the eye balls, and breath holding were all effective. The patient acquired the art of aborting attacks by making digital compression of the vagi himself. The extreme severity of the attacks in this particular case, the paroxysmal rate attaining 250 per minute, and there being as much as 2.5 cms. displacement of the left border, and alteration of blood pressures (Systolic of 84 mm. and diastolic of 76 mm. on one occasion) made the manoeuvre a life saving one. C. C. BIRCHARD

**Quinidine in Auricular Fibrillation.** EYSTER and FAHR: Arch. Int. Med., vol. 29, No. 1, January 16th, 1922.

THIS is a report of the results of the use of quinidine sulphate in the treatment of this cardiac disorder with the object of restoring normal rhythm.

CASE 1.—Female, aged 47 under treatment in hospital for considerable time for auricular fibrillation with marked heart failure—orthopnoea, anasarca, hydro-thorax. At time of beginning quinidine medication she had improved very much, and was comfortable. First day of treatment—Dosage of 0.75 gms. (12 grs.). Heart became rapid with alternating periods of regularity and irregularity; dyspnoea and cyanosis developed. Symptoms ameliorated after cessation of the drug. Second day—With the same dosage the results were similar to those of the preceding day. Third day—Dosage and results were as on the other two days.

CASE 2.—This was a young university student who had had auricular fibrillation for thirty-one months dating from an attack of influenza. Dosage was similar to that employed in Case 1. On the first day the pulse became regular for short periods, and the rate rapid. The patient complained of palpitation. On the second day periods of regularity were more pronounced. On the third day the pulse became regular and remained so, the rate at the same time falling to 66 per minute, and palpitation disappearing.

In the case of the female, quinidine caused re-appearance of all the signs of heart failure, and to such an extent that treatment had to be discontinued. In this case the quinidine was harmful. In the case of the young student, the return of regular rhythm was prompt and with a minimum of objectionable symptoms.

Reports in the literature indicate that quinidine is successful in about 50% of cases, and that, as in Case 1, its use may be harmful. C. C. BIRCHARD

**Further Observations on Treatment of Scarlet Fever with Immune Human Serum.** WEAVER, G. H.: J. A. M. A., October 29th, 1921, vol. 77, page 1420.

THE author has observed definite improvement in acute scarlet fever cases, following the intra-muscular injection of serum derived from 200 to 300 cc. of blood from an otherwise healthy convalescent scarlet fever patient during the fourth or fifth week of his disease. The serum is allowed to separate and 0.3 percent of tricresol added. The serum from 4 or 5 convalescents is mixed and kept on ice. Of this, 90 cc. are injected into the gluteal muscles No advantage has been noted in giving the serum intravenously. A. H. MACCORDICK

**Relation of Hodgkin's Disease to Sarcoma With a Report of Two Cases.** MUELLER, T.: Jour. Med. Research, June-September, 1921.

FROM 1914 to 1921, 16 cases of Hodgkin's disease were studied at the New York State Institute for Malignant Disease. In 14 of these the diagnosis was confirmed by microscopic sections. There were 10 males aged from 9 to 43 years, and 16 females from 13 to 48 years of age. In all the cervical and axillary nodes were involved and in 11 the mediastinal glands. In one case there were invasions of the lung, aorta wall and spinal cord by the lymphogranulomatous tissue. The study only tends to illustrate further the difficulty in determining the cause of the disease and its relation to sarcoma. The question again arises; Is Hodgkin's a true neaplastic disease, or is it an infectious process? The author is of the opinion that round celled sarcoma of the lymph glands and lympho granuloma are one and the same thing. A. H. MACCORDICK

## DERMATOLOGY

**Ichthyol in the Treatment of Erysipelas.** Eisler Leska Dermatologie, vol. 1, No. 6, 1920.

PURE ichthyol was used exclusively in a series of ninety-six consecutive cases of erysipelas in the following manner: The drug is spread over the affected area and a short distance beyond the margin. The entire surface thus covered is dotted with small particles of absorbent cotton. In hardening the ichthyol incorporates the cotton and makes a protective dressing, which adheres well to the skin surface. No bandaging is necessary and one application is sufficient. In most cases there is no tendency to peripheral extension. In practically every case of the series the temperature dropped, the distressing symptoms disappeared and the erysipelas cleared up in from four to six days.

To the capillary tonic and antibacterial action of ichthyol are attributed the favourable results.

PHILIP BURNETT

**The Treatment of Antenatal and Congenital Syphilis.** FORDYCE, J. A., and ROSEN, I.: Arch. Derm. and Syph., January, 1922.

COMMENT is laid on the importance of a routine Wassermann examination in every maternity case. The conclusion is reached that early and proper treatment of a syphilitic mother-to-be will allow of a healthy child being born. The importance of beginning early is dwelt on.

Treatment pursued by the authors is of 6-8 injections of arsphenamin, at weekly intervals, with mercuric salicylate or chloride, 1 grain, once a week for twelve to fifteen injections. Where tolerated the treatment is continued interruptedly during the entire pregnancy.

For the congenital syphilis they use the intravenous injection of neo-arsphenamin, and mercury, claiming good results in a series of 88 cases. H. E. MACDERMOTT

**Further Studies in Ringworm of the Hands and Feet.** MITCHELL, J. H.: Arch. Derm. and Syph., January, 1922.

THE writer finds an increase in the number of cases of this disease, and thinks that the increase is both real and apparent. The real increase he thinks was due to spread of infection by demobilized soldiers, their camps having a considerable amount of eczema marginatum.

However, he has been more on the lookout in late years.

The disease may be transmitted from husband to wife, where there is the typical affection between the toes, or by walking on gymnasium floors, or in corridors with

bare feet, or by towels even after being laundried. He emphasizes the need for microscopical examinations, saying that the diagnosis is otherwise unjustifiable.

Whitfield's ointment, salicylic and benzoic acids is highly commended, curetting of area beforehand being advised. In obstinate cases resort was had to 10 percent chrysarobin ointment.

For routine examination he thinks the K.O.H. and heat method is still the best. As regards cultivation, his experience is that it is easier to find the organism in the skin than to cultivate it in vitro. H. E. MACDERMOTT

### PEDIATRICS

**An Eruptive Fever of Unusual Characteristics in Infancy and Early Childhood.** LEVY, J. DAVID: J. A. M. A., December 3rd, 1921.

IN April 1919 Levy presented before the Wayne County Medical Society (Detroit) a preliminary report covering some twenty cases of an eruptive fever of unusual characteristics occurring in infancy and early childhood. Briefly, it is a disease of late infancy and earliest childhood, characterized by a period of high fever, followed by complete defervescence by crisis, and, during the early hours of the post febrile period, the appearance of a macular eruption. A most striking feature of the disease is the sudden occurrence of a high fever in a previously apparently healthy baby. The fever when first noted is generally from 103 to 104 F. and tends to remain between these temperatures and 105 and 106, with no intermission and with very moderate remissions for a period of from seventy-two to ninety-six hours. With the high temperature, as a rule, there are virtually no subjective symptoms worthy of note. On the beginning or the end of the fourth day, there occurs a complete defervescence by crisis. During the succeeding few hours, the eruption appears—first, on the trunk, most frequently in the lumbar and adjacent thoracic regions and often extending rapidly over the rest of the body, with particular preference for the back of the neck and the scalp. The face is only slightly affected and the lesions are relatively few on the arms and legs. The lesions are often round, more frequently irregular macules of from 1 to 3. in diameter, and are pale rose red, at times chiefly when scanty, being more distinctly pinkish. They are not elevated. They are always discrete, save for the very occasional grouping of a few macules. The eruption is now itching. It reaches its height in a few hours, fades rapidly and is generally entirely gone within forty-eight hours. There is no desquamation. The diagnosis has to be made between scarlet fever, measles, german measles and the fourth disease.

In conclusion Levy says—"Unless the foregoing can be demonstrated to be an ordinary exanthem existing in a typical form due to a variation of the local strain of the virus, we are here dealing with an entity actually constituting a new disease. Until proof to this effect can be demonstrated beyond peradventure, however, it would be well to consider it an anomalous form of rubella, which of all previously described diseases it most closely approaches." H. P. WRIGHT

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# News Items

## ONTARIO

The February Meetings at the Academy of Medicine, Toronto;—Section of Obstetrics and Gynæcology, February 2nd; stated meeting, demonstrations in physiology in the Medical Building, Toronto University, February 7th; Section of Opthalmology and Otolarngology, February 13th; Section of Medicine, February 14th; Section of Surgery, February 21st; Special Meet- of the Radiological Association to be addressed by Professor Baetjer of Johns Hopkins Hospital, 8.30 p.m., February 23rd; The Ontario Radiological Society is holding a meeting on the same date, February 23rd, at 2:30 p.m.; The Section of Pathology, on February 28th.

It is hoped that arrangements will be completed for the dedication of the new Osler Hall and for the reception of the copy of the Sargent portrait of Sir Wm. Osler which is to be given by Sir Edmund Osler to the Academy that the ceremony of dedication and reception can be carried out on April 4th, 1922. The evening is to be given over to an Osler Program in which details of Sir William's life will be discussed by those who had the good fortune to be in personal touch with him at various times in their professional career.

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The Lambton County Medical Society met on Wednesday, February 8th, in the Sarnia Chamber of Commerce. A paper was read by Dr. R. S. McComb of Toronto, on "Cystitis," and an address on "Heart Disease in General Practice," was given by Dr. Norman B. Gwyn of Toronto. After the papers, the election of officers for the next year took place. There was a good attendance and a free discussion.

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## QUEBEC

The 9th meeting of the Montreal Medico-Chirurgical Society, on the evening of February 3rd was addressed by Dr. J. Whitridge Williams, of Johns Hopkins Hospital, Baltimore, who took as his subject "Certain Obstetrical Aspects of Syphilis." This paper was based upon the examination of 4000 cases, which had been observed in his Service between April 1916 and December 1919. The conclusions arrived at were as follows:—

(1) The Wassermann reaction is at times unreliable, for in some cases while a negative reaction was obtained in the mother, the child was undoubtedly syphilitic. And again, in other cases, while the mother showed a positive reaction, the child was undoubtedly free from the disease. Far more reliable results are to be obtained from the examination of the placenta. If the placenta showed the characteristic changes of syphilis, the so-called Frankel's Disease, in from 85 to 90 p.c. of these cases, the child was syphilitic. The placenta

thus affords very reliable evidence of foetal syphilis. Williams's figures shows that it presents a reliability almost double that of the Wassermann. (2) The pregnant woman responds quickly and completely to antisyphilitic treatment. The increased volume of the mother's blood, and its hydraemic quality, may account for this. (3) Syphilis, in the new-born child may be recognised by an x-ray examination of its long bones. The changes to be observed occur at the junction of the epiphysis with the diaphysis, where, instead of the narrow, slightly curved line, 1 mm. in thickness, —Guerin's line—there is to be observed in the x-ray picture a dark, irregular, somewhat folded zone, 2 or 3 mm. in thickness. This change is due to an osteochondritis, and is clearly seen in the x-ray picture. The lower end of the femur, and of the tibia, and the upper end of the humerus, are the sites where the disease is most manifest.

In the Obstetrical Service at Johns Hopkins' Hospital, syphilis is found four times more frequently in the colored patients than in the whites. Dr. Williams closed his interesting Paper with the warning that syphilis was often overlooked. He warmly advocated a routine examination of the placenta for evidence of this disease; both with the naked-eye and with the microscope; and, if possible, the routine employment of the Wassermann.

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### MONTREAL OPTHALMOLOGICAL SOCIETY

The first regular meeting for the season 1921-22 was held at the Medical Society's rooms, 112 Mansfield St., on Tuesday evening, November 15th at 8.30 o'clock. The following living cases were presented for inspection by the members:—

Amaurotic family idiocy and a case of blastomycosis, by S. H. McKee; Retinitis Proliferans, by G. H. Mathewson; Cataract in a boy of 19, by A. B. Moore; Central degeneration of the retina, by J. Rosenbaum.

The following case reports were read and the specimens shown:—Metastatic Carcinoma of Choroid, by J. Macmillan; Removal of piece of Glass from an eye 7 Years after Accident, by F. T. Tooke; Cross and Microscopic Glioma of Retina, by S. H. McKee: (1) Tuberculosis of the Iris, by S. H. McKee; (2) Gonococcus Slide (special stain), by S. H. McKee; (3) Two slides of Morax (diplo-bacilli), by S. H. McKee.

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## BRITISH COLUMBIA

A clinical meeting of the Vancouver Association was held on January the twenty-third at Shaughnessy Military Hospital. A number of cases of disease of the nervous system were shown as well as others illustrating the results of gunshot wounds of the chest and empyema. This society held a special meeting on February the fourth for the purpose of discussing a recent enactment of the City Council of Vancouver, by which the medical men of the city are required to pay a tax of twenty-five dollars per annum. Drs. W. D. Brydone Jack and O. Weld were appointed a special committee to interview the Council and enter a protest on the plea, that, as medical men generally do so much free work, they should be exempted from taxation of this order.

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Dr. C. H. Vrooman addressed the health bureau of the Board of Trade of Vancouver on January 18th, his subject being tuberculosis. He stated that one hundred more beds were immediately necessary. The total beds available in the Province were 260, and the total deaths in British Columbia last year were 446. The minimum accommodation needed for dealing effectively with the disease was one bed for each death. He also suggested that the next step necessary in British Columbia was the appointment of a travelling medical officer, who would act as a consultant and would have a certain amount of authority in getting patients into hospital.

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Dr. J. S. MacPherson, C.M.G., who has been practicing in the Shawinigan and Cobble Hill district of Vancouver Island, has been appointed medical health officer of the municipality of Lomond, Alberta.

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Dr. J. Kerr Wilson, resident of Vancouver for the past thirty years, died at the Vancouver General Hospital on January 21 after an illness of ten days. He was born near Bell's Corners in the Ottawa Valley and was 68 years old. Dr. Wilson was one of the first doctors to practice in Vancouver but retired from practice some years ago to take up ranching in the Fraser Valley. He had no children and is survived by his wife.

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Dr. Gilbert Hartin, one of the best known physicians of British Columbia, died in Nelson, B. C. on February 4th of cancer. He was a native of Stittsville, Ontario; graduated at McGill in medicine; commenced the practice of his profession at Kaslo, B. C. in 1896, and in 1907 moved to Nelson. He is survived by his wife and two sons, H. T. Hartin of Winnipeg, and Dr. D. H. Hartin, of Nelson.

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## THE WINNIPEG MEETING

**The annual meeting of the Canadian Medical Association will be held in Winnipeg June 20th to 23rd inclusive, 1922. The present time is none too early to be thinking about your hotel reservations. The Committee on Hotels and Information are very anxious that medical men intending to come to Winnipeg should write early regarding hotel accommodation. The Chairman, Dr. Gordon S. Fahrni, 507 Boyd Building, Winnipeg, will be glad to receive inquiries.**

# Obituary

## DR. ALLEN MacKENZIE BAINES

The death of Dr. A. M. Baines on January 12th, 1922, at his home in Toronto, brought genuine sorrow to many hearts both in and out of the profession and severed another link with the standards and outlook of fifty years ago. His jovial and whole hearted attitude towards life was combined with a tenacious conservatism towards all that was sound and good in the social and professional customs of Canadian and British life as he became acquainted with it in his plastic days. Born into a large and well known To-

ronto family on May 12, 1853, he was educated first at the school in Cobourg, Ontario, conducted by Mr. Barron, father of the present Judge Barron of Stratford; and later, he was in Upper Canada College, 1867-70, from his fourteenth to his seventeenth year. Here, doubtless, he laid the foundation of his sound training in various sports and games, of which cricket claimed his best allegiance. He was Captain of the U. C. C. Eleven, and, after leaving College for a brief business career with the firm of Moffatt Murray and Beatty, we find him at nineteen, one of the eleven chosen to play the English Eleven visiting Canada in 1872. under Fitzgerald, which included the famous Dr. W. G. Grace, surely a distinction for the youthful cricketer. He appears in the well known engraving by Rolph, Smith & Co. showing the teams on the historic old cricket ground on the South side of College Street, between McCaul and Beverley Streets. One of the tales told of that match is that when his score was standing at 21, the redoubtable W. G. with Allen Baines bowling, was given his life by a dropped catch and went on to 144 "not out." Bowling, fielding and batting all came alike to Baines' hand in those days. Fishing was a later pastime as was lawn-bowling and music.

He seems, during his brief period of commercial life to have fallen under the spell of the well known Dr. E. M. Hodder, of Trinity Medical College, where he entered in 1874, and we find him graduating from both Trinity University and from the old Toronto School of Medicine. In 1879, he took his L. R. C. P. London, where he remained for nearly four years doing much of his work in St. Thomas' Hospital. On taking up practice in Toronto in 1882, a serious illness necessitated a long sea voyage, and he went out to India, but not for long; and for almost forty years he made the community his debtor as a "Doctor of the old school" in hospital and private practice. His appointments as a teacher and examiner in medicine were many and various. His hospital career identified him mainly with the Hospital for Sick Children, where he served for thirty years, from 1891 to 1922. He served as physician in chief from 1913, and at his death, was a consultant physician, being retired from the active staff in 1919.

He will be remembered, too, by many for his work in the old Toronto General Hospital, both in the wards, and perhaps better still, in the outdoor department. He transferred from the active to the consulting staff of the T. G. H. in 1907-8 to devote his time fully to his duties in the hospital for Sick Children. His academic connection was first with Trinity Medical College where he lectured first on medical jurisprudence, and where he taught diseases of children and clinical medicine from 1891, becoming associate professor of clinical medicine and Professor of Pædiatrics in 1895, and upon the amalgamation of the two schools in 1903, transferring to the University of Toronto with the same rank and appointment.

He had long been specially interested in diseases of children, having been physician to the Infants' Home from 1882. He was on the staff of the hospital for incurables from the same date.

He was married in 1890 to Rose Jeanette Alice Troughton, a Devonshire lady, whose death six years before his own was a bitter grief to him. Their only child died in infancy.

He was a fine representative of a type of practitioner unfortunately not nowadays often produced, who avoided narrow specialism, maintained kindly humane relationships with master and man alike, and lived out the motto, "Nihil humanum a me alienum puto."

J. T. F.

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## DR. JOHN M. ELDER

There has passed from our midst a most notable member of the medical profession, J. M. Elder, C.M.G., B.A., M.D. After taking his B. A., he entered as a student the Faculty of Medicine of McGill in 1881, and after a distinguished career as a student and athlete, he graduated in 1885. He commenced practice in his native county of Huntington, but in a few years left the country and began work in Montreal, and was in a short time appointed assistant demonstrator of anatomy. In 1894 he succeeded Dr. Birkett as senior demonstrator, and in 1896 he was chosen to be a lecturer in anatomy, and also in medical and surgical anatomy. In the same year he received the appointment to a demonstratorship in surgery, after his election as an assistant surgeon to the Montreal General Hospital. He was made assistant professor of Surgery in 1897, and in 1898 became a full surgeon to the Montreal General Hospital, succeeding Dr. Kirkpatrick whose early death was much lamented. Thus Dr. Elder in the comparatively short space of eight years rose from an assistant demonstratorship of anatomy to be a lecturer in anatomy, and the assistant professor of surgery, and became an attending surgeon to the General Hospital. This fact college and in the hospital, and was an administrator of no mean talent. He was always a favorite with the alone speaks strongly for his ability, energy and work, Dr. Elder was a most excellent teacher both in the students entering with zest not only into their studies,

but into their games for he was a good football player, and interested himself greatly in the athletic sports of the students. He was a man who held strongly his own opinions and was not backward in expressing them, always taking a strong stand for what he thought right.

He was much esteemed by his colleagues, and beloved by his patients. As a surgeon he was an acute diagnostician, and a careful operator, his long training in anatomy giving him great confidence. He kept well abreast of the times, and made many contributions to the literature of surgery. By the public at large, he was highly esteemed, and he left a very large practice behind when he went overseas with the McGill General Hospital as surgeon. No man will be more missed by his confreres than Jack Elder. He had much individuality, and every one who met him felt his personality. I, the writer, speak as one who has known him as a student, an assistant, and a colleague. F. J. S.

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Colonel Elder's military career was equally as conspicuous as was his professional career. In 1885, just after graduation, he received the appointment of Surgeon-Captain to the Montreal Garrison Artillery, and went with this unit to the North-West, in which he served with distinction during the Riel Rebellion. On his return he maintained his interest in medical military affairs by continuing as medical officer to the Garrison Artillery, and was in a few years promoted to the rank of Surgeon-Lieut. Colonel, going on to the Reserve of Officers in 1900.

When the Great War broke out and the formation of No. 3. Canadian General Hospital (McGill) was under consideration, Colonel Elder was the first to volunteer his services, and when the organization of this unit was begun he was appointed Officer in charge of the Surgical Division. The selection of officers for that Division was largely his own, and the wisdom shown in its organization was proved later by the excellent work done. In his service overseas during a period of more than two and a half years, Colonel Elder's exceptional surgical skill and valuable organizing powers brought him a mention in despatches by Field Marshall Sir Douglas Haig in 1917 and a further recognition of his services by being made a Companion of the Order of St. Michael and St. George.

In the actual surgical work of the McGill Hospital Colonel Elder took a most active part, and during a battle period, when the work was heavy he was known to be occupied in the operating room from early morning until late at night. It was during one of the heavy periods of work on the 11th of May, 1916, while operating upon a suppurating gunshot wound of the thigh, that he received a streptococcal infection of the right forefinger which was followed by a serious illness and a protracted convalescence. On the retirement owing to illness, of the Commanding Officer of the Hospital in November, 1917, Colonel Elder was appointed his successor and continued as such until February 1918 when he received the appointment of Consultant to the British Army with Headquarters at Rouen; his organizing ability and experience as a consultant at this time proved of great value. Dr. Elder returned to Canada in January, 1919.

Colonel Elder by his genial and sympathetic disposition endeared himself to all the officers, nursing sisters, and men of the McGill Hospital, and was much beloved by the wounded soldiers owing to his untiring attention and kindness to them. His untimely removal from amongst us is deeply mourned by all those whose privilege it was to work with him in the Great War. H. S. B.

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### DR. GEORGE C. C. FIELD

Dr. George Corelli Collard Field died in Winnipeg on Sunday, January 29th, after a short illness. A graduate of Trinity Medical College in 1894, he was one of the House Surgeons of the Hospital for Sick Children in Toronto. After pursuing studies in Edinburgh, Glasgow, London and Baltimore, he settled in Winnipeg where he has been practicing and teaching in Diseases of Children. He was lecturer on the staff of the Manitoba Medical College and head of the children's department of the Winnipeg General Hospital. He was buried at his old home in Cobourg on February 2nd.

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### DR. A. I. HENWOOD

Dr. A. J. Henwood died in Brantford on January 19th. Few men have had a more interesting medical inheritance, grandfather, father and two uncles were all graduates in medicine and practitioners. His father was one of the earliest house officers in the old Toronto General Hospital, going later to Brantford where he became an active member of the County of Brant Medical Association. Dr. Henwood's mother was a daughter of the late Dr. Alfred Digby of Brantford, another of the great medical pioneers of the province. Dr. Henwood's early education was at Dr. Tassie's famous Academy at Galt, then at Upper Canada College, and he took his degree of M.D.C.M. at McGill, in 1879. He was one of Brantford's best known physicians, and was for long at the head of an extensive and active practice.

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### DR. DONALD DARRACH

Dr. Donald Darrach of Kensington, P E. I. died suddenly at his home in his 77th year. When a boy he obtained a scholarship for two years at the Prince of Wales College. He was a brilliant mathematician, one of the best who ever attended that institution. Shortly after finishing his course in it, he entered Bowdoin Medical College, Maine, and afterward Harvard Medical College, graduating in 1872. He practiced his profession at Kensington, P. E. I. for 11 years visiting his Alma Mater nearly every year. He was a member of the Massachusetts Medical Society. Owing to failing health, he retired from practice in 1884, and later on entered into business in which he was very successful. He was an enthusiastic Mason, and had the 33rd degree conferred on him. His name on most occasions headed the list in any philanthropic or patriotic undertaking. He was one of nature's gentlemen. He leaves a widow, three sons and one daughter, the wife of Dr. J. F. McNeill, Summerside.

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### DR. C. T. CAMPBELL

Dr. C. T. Campbell died in London, Ontario, on February 2nd in his eightieth year. A graduate of the Cleveland Homeopathic Medical College in 1865, he was a member of the Board of Examiners of the Ontario College of Physicians and Surgeons, and was later a member of the Ontario Medical Council. In 1893, he was elected President of the Canadian Medical Council. He served for many years on the London Board of Education, of which he was Chairman in 1884. He was later an Alderman of the city, and, in 1905, its Mayor. He was well known for his researches in the History of Canada and Middlesex, was President of the local Historical Society in the years gone by, and was a contributor on Historical subjects to various magazines, as well as being the author of a work on The Pioneers of London District. For some years, he was lecturer on Sanitary Science at the London Normal School and Victoria Hospital Training School for Nurses. He was well known in freemasonry and was Grand Sire of the I. O. O. F. in 1893-94.

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### DR. HENRY MEEK

Dr. Henry Meek, for many years connected with the Western University Medical School, died in London

on Wednesday, January 11th. He had been at all times interested in the Medical School; was a member of the Excutive and Professor of Gynæcology until his resignation owing to illness two years ago. Born in Fingal, he began the practice of medicine near Port Stanley, coming later to London, and becoming connected immediately with the Western School. One of the best known surgeons of the Western part of the Province, he was also one of the earliest followers of Aseptic Surgery, and was known for thirty-five years as a skilled Gynæcologist and Obstetrician. Unlike the majority of surgeons, he had acquired a remarkable working knowledge in Neurology and Psychiatry, and much of his remarkable success in his profession was due to the fact that his knowledge of the individual equalled his understanding of their surgical condition. He was a teacher who, by his example and precept, had a far-reaching influence, and, in his death, the profession at large suffers a severe loss.

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Dr. Alexander Bryson Osborne died in England on January 28th in his 59th year. A graduate of McGill in 1886, Dr. Osborne soon became one of the best known oculists in Canada. To a remarkable and attractive personality, he added a skill and dexterity which impressed quickly all who came in contact with him. Another of the pupils of the celebrated old Dr. Tassie of Galt, he was one of the characters that remind us forcibly that some of the education in the early days of Ontario left a mark which is quite distinctive. In poor health for many years, he gave up his work when the war broke out to take his part and served in the Canadian Hospital at Taplow. Returning to Hamilton, it soon became evident that his health would not permit resumption of work, and he retired to England a year ago. An active member of all Canadian Medical Societies and a contributor for many years to the Opthalmological Journals, he was also keenly interested in many outside matters, particularly the Canadian Militia, and, as surgeon to the old thirteenth battalion of Hamilton, he was a familiar figure in all military gatherings. He was an active club member and a supporter of the many athletic associations for which the city of Hamilton has been so famous, and certainly one of the best known and best liked personages in the city and its social life.

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# Book Reviews

**The Blood Supply to the Heart in Its Anatomical and Clinical Aspects**—By Louis Gross, M.D., C.M., Douglas Fellow in Pathology, McGill University, and Research Associate, Royal Victoria Hospital, Montreal. With an introduction by Horst Oertel. With 29 full page plates and 6 text illustrations. Paul B. Hoeber, 69East 59th St., New York. $5.00 net.

This monograph is the result of a study undertaken by the author dealing with the structural evolution of organs in the various age periods in relation to normal function and disease. The material accumulated in the study of the heart lead the author far beyond the scope of his original investigations and has allowed him to present other observations, and results of investigations. Following a presentation of the technique followed by him he presents: (1) A description of the arterial and venous blood supply to the normal heart with a statistical study of its variations. (2) The blood supply to the bundle of His. (3) A discussion of the anatomical factors concerning the etiology and development of valvular endocarditis. (4) A view of the changes in the cardiac circulation as age advances and their relation to function both physiological and pathological. Injection of the coronary and other vessels were made with barium sulphate suspension in gelatine. After injections the hearts were roentgenographed stereoscopically, cleared, and finally dissected and sectioned. Further by serial sectioning the minute circulatory structure was studied. He not only demonstrates the profuse and abundant anastomoses of the branches of the right and left coronary arteries, but also how these enlarge in the later decades of life, providing for the nutrition of the left ventricle in case of degeneration and partial obliterative changes which may take place in the main trunk of the left coronary in the later decades of life. There are not only anastomoses between the right and left coronary arteries in their capillary and precapillary distribution but between the branches of each coronary artery, and between the coronary arteries and vessels from adjacent attached organs (bronchial, internal mammary, diaphragm, parietal pericardium). The anastmoses in the heart are universal and abundant. In the study of the blood supply to the valves of the heart, it is demonstrated that in the foetus there is considerable musculature present and with this a rich blood vessel supply, greater on the right side, that as foetal life progresses there is regression of both musculature and blood vessels but infant's valves still frequently contain both, that the aortic cusp of the mitral valve is the last to show regression of musculature and blood vessels, that some adult hearts show persistence of valvular vessels, and that practically all cases of valvular endocarditis show a distinct vasculature. It would appear from the evidence presented that there is good ground for the assumption that valvular endocarditis may be embolic in origin. The study of the changes in the coronary circulation in the succeeding decades of life are most interesting and have a great clinical interest. The illustrations of those changes are clear and convincing. Unstinted praise must be given to the author and to Hoeber, his publisher for the excellence of the illustrations throughout the text. No recent valuable contribution to medical science has been better presented either in form, text or bookmaking. There is a valuable bibliography as well as a subject index and index of the personal names appearing in the text.

This research has been carried on by the author while Douglas Fellow in Pathology, McGill University and Research Associate, Royal Victoria Hospital. We learn from a recent number of the British Medical Journal that Dr. Gross has been elected by the trustees to one of the Beit Memorial Fellowships and will undertake microscopic and macroscopic experiments in relation to the condition of intestinal stasis at the Royal College of Surgeons of England and at the Zoological gardens. J. H. E.

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**The Anatomy of the Human Orbit and Accessory Organs of Vision.** By Ernest Whitnall, M.A. M.D., B.Ch. (Oxon), Professor of Anatomy, McGill University, Montreal; late University Demonstrator of Human Anatomy, Oxford. London: Henry Frowde and Hodder & Stoughton. Toronto: McAinsh & Co. Price $10.50.

This work, as stated by the author in his preface, is primarily intended for the use of opthalmologists; but it is hoped that the necessary incorporation of matter relative to the neighbouring nasal region will

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also prove of interest to the rhinologist, and that as a regional study the whole will commend itself to the general anatomist.

Professor Whitnall's book is deserving of the highest praise. One feels throughout that an enthusiastic teacher is aiming directly at preparing clear conceps for the comprehension of practical opthalmic problems, and, indeed, the work embodies, in an amplified and completed form, lectures that were originally given to candidates for the Oxford Diploma of Opthalmology. The arrangement of the subject is admirable, and, because of a proper appreciation of values, the treatment is at once both comprehensive and concise. The reviewer has been especially impressed by the sections dealing with the accessory air sinuses of the nose, the lacrimal apparatus, and the ocular muscles, as well as by the paragraphs summarizing what is known of the lymphatics and the fascia of the orbit. The value of the work is heightened by an appendix on the cerebral connections of the nerves, which is well done.

The volume is profusely illustrated, especially by a large number of splendid photographs of dissections and preparations, and by numerous original diagrams of merit. One could wish with Professor Whitnall that the cost of colored illustrations had not prohibited their more general use, particularly in connection with the chapter on the vessels; but, by comparison, modern pedagogic requirements are amply met in this connection. A carefully edited bibliography is appended, and the index is satisfying.

After careful perusal the reviewer feels that Professor Whitnall has produced a book, unique in English, that will take its place beside the classic works on the anatomy of the orbit, and one that from now on will be regarded as indispensable to students of ophthalmology. W. Gordon M. Byers.

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**History of Medicine With Medical Chronology Suggestions for Study and Bibliographic Data.** By Fielding H. Garrison, M.D., Lt.-Colonel, Medical Corps, U. S. Army, Surgeon General's Office, Washington, D. C. Third Edition, Revised and Enlarged. Octavo of 942 pages with 257 portraits. W. B. Saunders Company, Philadelphia and London, 1921. Cloth $10.00 net. Canadian Agents, The J. F. Hartz Company Limited, Toronto.

The first edition of this work which appeared in 1913 required reprinting in 1914. It was revised in 1917, and now we welcome the third revised edition. Recent investigations in the history of medicine have added much to our knowledge of ancient and medieval medicine and Dr. Garrison has found a place for the work of others who, like himself, have been doing research in history and progress. Almost 200 pages have been added to his first work while the index has grown from 29 to 42 pages. Likewise the list of notable contributions to medical biography and the history of special subjects has grown from 18 to 32 pages. With the resources of the Surgeon General's Library about him, Dr. Garrison has written a book which can only be described as monumental, filled with a wealth of detail, and demonstrating clearly the stepping stones of progress in medicine and its related sciences. As a reference book of physicians who have contributed to the growth of knowledge it cannot be surpassed, while the large number of portraits it contains adds enormously to the brief but illuminating biographies throughout. He has shown a remarkable ability to measure comparative values and the outstanding men who have left their impress at various times and at various schools are sketched in his own inimitable style. Particularly valuable for reference are his multitude of notes relative to original descriptions of diseases. The medical profession owe a deep debt of gratitude to the author for his painstaking labors in presenting this history which is as nearly accurate as humanly possible in its chronology and references, while the new matter added makes it the most comprehensive history of its size ever attempted. J. H. E.

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**South America From a Surgeon's Point of View.** By Franklin H. Martin, C.M.G., M.D., F.A.C.S. In collaboration with William J. Mayo, M.D., and Francis P. Corrigan, M.D. Introduction by William J. Mayo, M.D., F. A. C. S.

This small volume of pocket size contains a pleasantly written description of a trip made by several members of the American College of Surgeons through the Panama Canal to the chief cities in Peru, Chile, Argentina, Uruguay, Brazil and Bolivia. In addition to the pleasure of making such a trip while our Northern cities were experiencing rough wintry weather, the party had also as an object the furthering of a better acquaintance with the members of the profession in the Southern Continent, and the inspection of their hospitals with a view of noting the character of the surgical work performed in them, and the efficiency of their nursing staff. It was hoped at the same time, that they would be able to interest in the college many of the surgeons they might meet to the extent of establishing branches in the larger cities, and appointing committees on credentials to select the names of several who might be eligible for membership in the college. The pleasures and beauty of the trip are well described and well illustrated with numerous woodcuts. We have read the book with great interest, and can recommend it not only to every member of the American College of Surgeons, but to any physician who may desire to know more of our Southern confreres, or proposes making a trip to some of the most delightful scenes in the world. A. D. B.

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**Manual of Diseases of the Stomach.** By Wm. McLennan, M. B., Honorary Consulting Physician, Western Infirmary, Glasgow. Published by Edward Arnold & Co., London, 1921.

A very serviceable book for the student and general practitioner as there is nothing in it beyond the ready comprehension of any reader. An excellent introduction on the physiology of digestion is followed by concise descriptions of the methods of gastro-intestinal investigations. One is pleased to see a proper consideration of both X-ray methods and chemical examinations, and the inference one draws is that the author relies on no one point to the exclusion of others. There is little that is new in the arrangement of gastric and intestinal disorders though this is not to be wondered at since, after all, the number of diseases of the gastro-intestinal tract is not large. Proper stress is laid upon the influence of the nervous system introducing symptoms, and it is well pointed out throughout the volume that the observer who takes no count of the influence of emotions in producing symptoms in the gastro-intestinal tract. There are one or two small points which need elucidation,Loewi's Test, the dropping of something (Atropine) in the eye, to diagnose a disease of the pancreas, and a description of the vagus nerve with sensory endings capable of conducting pain, certainly do not seem in accord with a clear scientific view. There are more than the usual number of printer's errors. N. B. G.